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Copper in Steel—Its Influence on Corrosion*

Tests Under Varying Conditions Show That a Small Copper Content Materially Increases the Life of Sheets

BY D. M. BUCK†

In order to establish the value of small amounts of copper in steel when exposed to natural corrosion and under atmospheric conditions, a series of tests was undertaken by the writer. That a thorough understanding may be had of the results of these tests, we will describe briefly the preparation of the steels entering into this investigation. To avoid the possible uncertainty in comparing different heats of steel with and without copper, and in order that the conditions, except the copper content, should be identical, it was decided for these comparisons to copperize portions of heats, leaving other portions of the same heats in their original conditions.

Three heats were used. One was a regular basic open hearth; the second was a basic open hearth heat rephosphorized, and the third was a regular Bessemer steel. The analyses follow:

	C.	Mn.	S.	P.
First heat	0.10	0.34	0.034	0.019
Second heat	0.13	0.45	0.036	0.042
Third heat	0.08	0.46	0.070	0.096

In pouring the open hearth heats several ingots were first poured without the introduction of copper; then to four ingots sufficient copper was added to obtain in two of them about 0.15 per cent. and in the other two about 0.25 per cent. copper in the finished product. The Bessemer heat was treated in exactly the same way, except that, since the average Bessemer heat is too small to furnish six ingots of the size desired, only two ingots were copperized, aiming at the same contents as in the case of the open hearth. The copper was added to the molds a little at a time as they were filling, and that the resultant steel was uniform in its copper content was demonstrated by many analyses of the bars and of the finished sheets. Indeed, that copper easily diffuses through the bath of molten steel and does not segregate on cooling is a well-established fact.

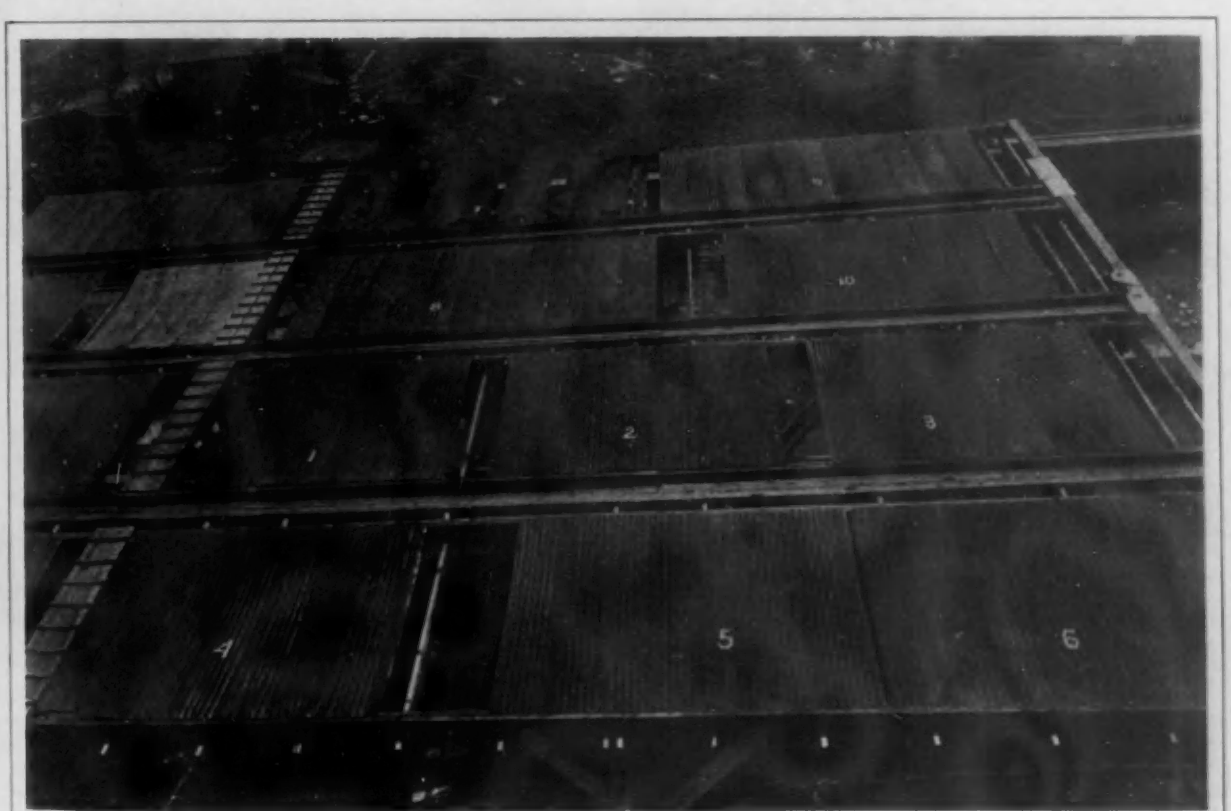

Fig. 1—Corrugated Sheets of No. 27 Gauge Placed in November, 1911, in the Pennsylvania Coke Regions. Photograph Taken June 27, 1912. See Fig. 2 for Composition of Sheets

*A paper read at the annual meeting of the American Chemical Society at Milwaukee March 25, 1913.

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Six ingots were then taken from each of the open hearth heats—two normal, two with 0.15 per cent. copper and two with 0.25 per cent. copper—and three ingots from the Bessemer heat—one normal and one with each content of copper. The 15 ingots thus prepared were carried through the usual mill operations, each bar as cut and each sheet as rolled being chalk-marked so that no confusion could possibly occur, and finally a sample of each lot was again carefully analyzed as a double check on the operations.

One ingot of each grade of open hearth was rolled into 16 gauge and the other into 27 gauge sheets, 30 x 96 in., while in the case of the Bessemer steel one-half of each ingot was rolled into 16 and the other half into 27 gauge. All grades were subjected to exactly the same treatment, being rolled by the same crews and annealed in the same furnaces at the same time, and the finish was such as to conform with that of the competitive sheets used in this test. From 24 to 36 sheets of each of the nine grades, both gauges, making 18 lots in all, were then sheared to 24 x 96 in., thus obtaining a strip 6 in. wide from each sheet. These strips were sheared into 2 x 4-in. test pieces, stenciled with distinguishing marks, and were used for corrosion tests which will be described later.

spaces were left between the courses, so that the drip from one row did not run on the row below.

In addition to the nine grades before mentioned there were purchased in the open market 27 gauge and 16 gauge sheets of the following average analysis:

	Per Cent.
Carbon	0.02
Manganese	0.03
Sulphur	0.034
Phosphorus	0.003
Copper	0.06 to 0.07

These sheets were exposed at each of the test stations at the same time as the others and under identical conditions. All of the sheets were placed on the roofs in November, 1911, and were entirely unprotected by paint or other coating from the first, except the thin film of oxide always present on an annealed sheet, allowing natural corrosion to start immediately and to proceed without interruption. The 16 gauge sheets were placed on one half of the roof and the 27 gauge on the other half.

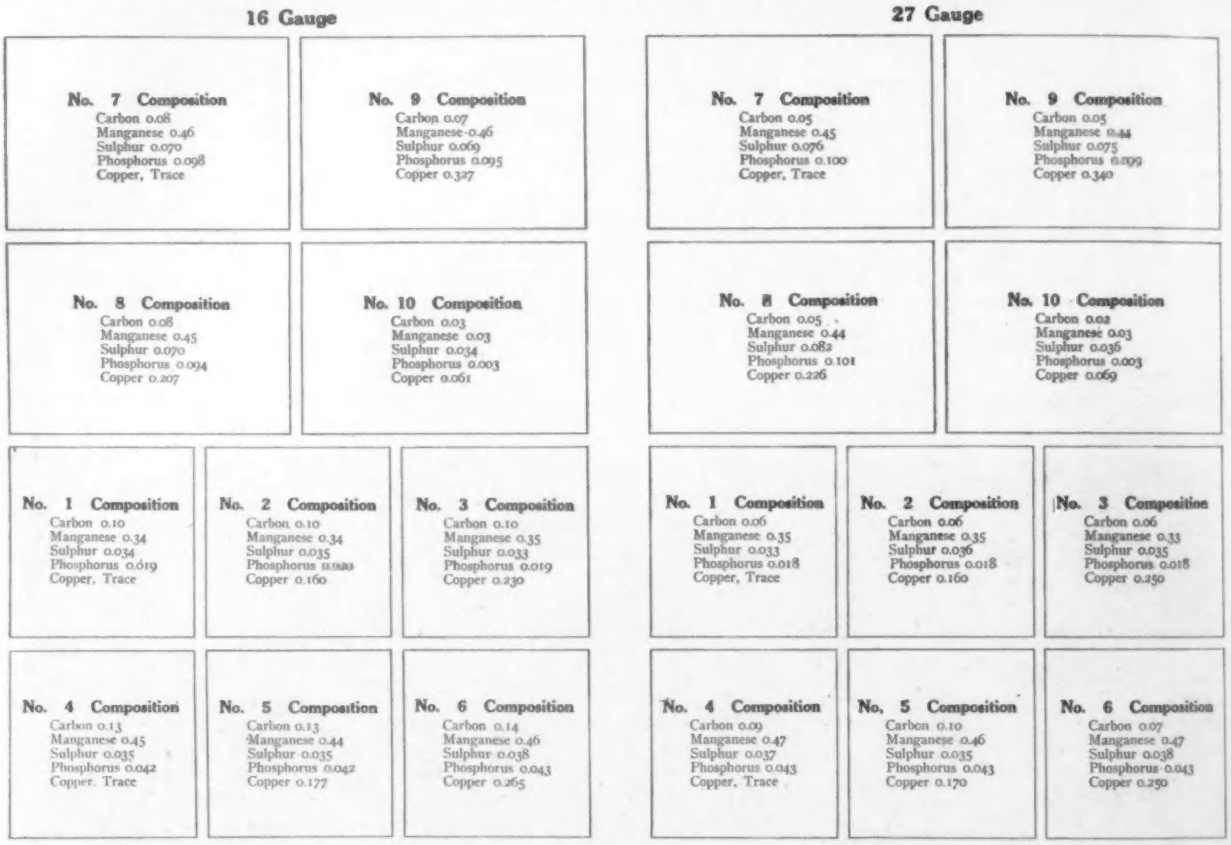


Fig. 2—Diagram of the Numbering and Composition of Panels of Corrugated Sheets at All Three Locations for Exposure Tests

Three Testing Stations

The 24 x 96 in. sheets were corrugated in the usual way, and 8 to 12 sheets of each grade shipped to each of the three testing stations. One of these is located in the Pennsylvania coke regions, where the air contains notable amounts of sulphurous and sulphuric acids and other fumes from the coke ovens. In this district iron and steel unless protected corrode very fast. Another station is located on the sea coast, where the air carries sodium chloride. The third is in a rural community, where the air is quite pure and free from added corrosive agents.

At each of these locations a skeleton wooden building was erected, 40 ft. x 80 ft., with a sloping roof at an angle of about 18 deg., with the low side about 6 ft. from the ground. The buildings were entirely open and free to the passage of air on all four sides, and the roofs were uncovered until the sheets were put on, the purlins being 92 in. apart, thus allowing for a 2-in. hold on each end of the sheets. The sheets were arranged in panels, each grade being separated from the other by an open space. Open

The sheets at all of the test stations were inspected from time to time by the writer and by other independent inspectors, and within a short time after corrosion had started the higher copper steels were showing a considerable advantage over the others.

Panels Nos. 1, 4 and 7 (Fig. 2), which contain no copper, were rough to the touch and an examination of the surface of the steel under the rust gave evidence of well-developed pitting. Panel No. 10, the low carbon and manganese material with only 0.07 per cent. copper, was not quite so rough and the pitting not quite so well developed, while panels 2, 3, 5, 6, 8 and 9, which contain 0.15 to 0.34 per cent. copper, were fairly smooth to the touch with scarcely any pitting. An interesting fact was noted regarding the color of the rust on the various panels. The oxide on the non-copper steels was a bright red and loosely adherent. That on panel No. 10 was a little darker, while the copper-bearing steels carried a dark brown, closely adhering oxide. It was possible to distinguish them by their color at a considerable distance from the building.

Fig. 1 is from a photograph of the 27 gauge side of the roof in the coke regions, taken June 27, 1912. The non-copper panels Nos. 1, 4 and 7 were failing and falling off, having rusted entirely through. All of the copper bearing steels were still in excellent condition.

Fig. 3 is from a photograph of the same roof taken

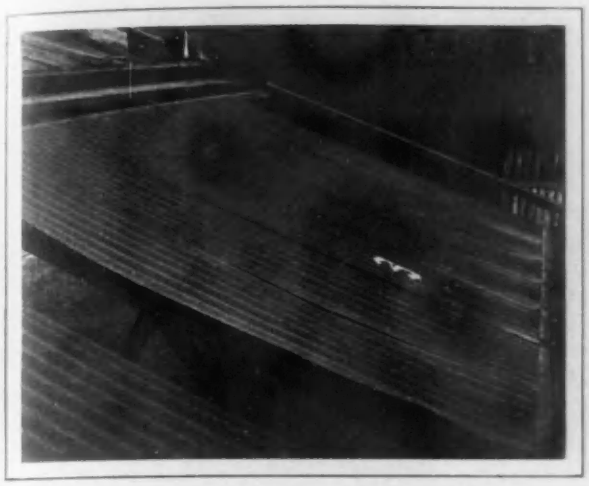


Fig. 4—Nearer View of Panel 3 of Fig. 3

Fig. 5—Nearer View of Panel 10 of Fig. 3

December 7, 1912. Panels Nos. 1, 4 and 7 had entirely disappeared, and No. 10, the low carbon and manganese material, had failed to the extent of dropping off. Fig. 4 is a nearer view of panel No. 3 and Fig. 5 is a nearer view of panel No. 10, both taken on the same day as Fig. 3. All of the copper-bearing panels are still intact and will last several months before ultimate failure. This roof was again inspected early in March, 1913, and panel No. 10 had entirely disappeared, while all of the copper-bearing steel sheets were still in place.

Fig. 6 is from a similar photograph of the 27 gauge side of the sea shore roof, taken September 7, 1912. The panels were in about the same condition as those in the coke regions were some months earlier. Unfortunately a few weeks after these sheets were placed, an unusually severe gale ripped off all of panel No. 9 and parts of Nos. 7, 10, 3 and 6.

Fig. 7 is from a photograph of the 27 gauge side of the roof located in a rural district, taken February 20, 1913. While none of the copper-bearing materials have failed up to the present time at either of the last two roofs, yet panel No. 10 at both places is in very poor condition and will fail very soon, much before the other copper-bearing steels, thus checking up the results obtained in the coke regions. The 16 gauge sheets at all of the test stations are giving the same relative differences as the 27 gauge, but being four times as thick, are not yet in condition to reveal their differences in a large photograph.

At the same time that the large sheets were exposed, a series of 2 x 4-in. test pieces cut from the same sheets were carefully weighed on a chemical balance, then mounted in wooden racks, with free access to the weather, and exposed at each station. Six pieces of each grade, each piece from a different sheet, were used in this test

Fig. 3—Photograph of Roof Shown in Fig. 1 But Taken December 7, 1912

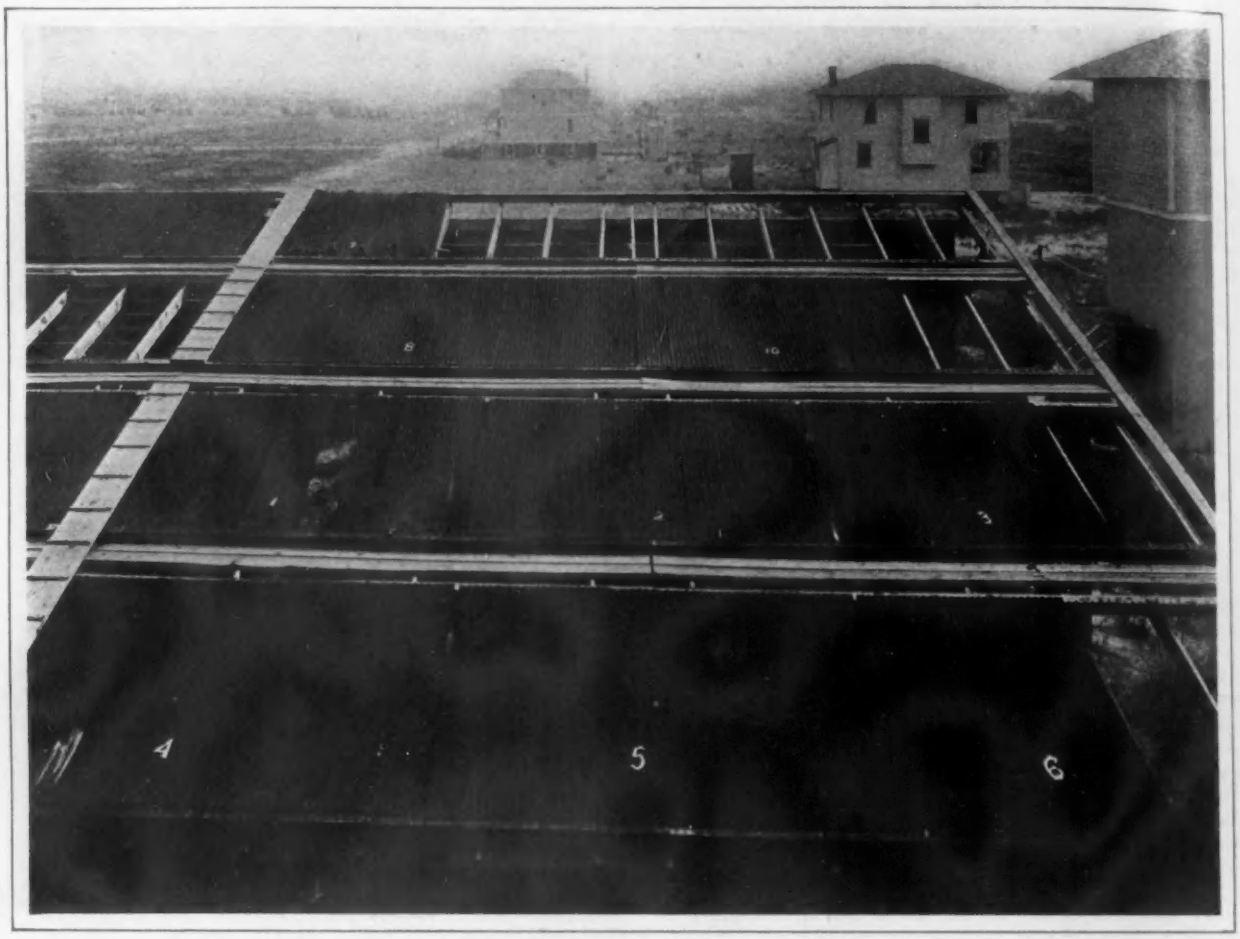


Fig. 6—Corrugated Sheets of No. 27 Gauge Placed in November, 1911, at the Seashore. Photograph Taken September 7, 1912. See Fig. 2 for Composition of Sheets

and a duplicate set prepared and exposed after first removing all surface oxides. After a suitable time had elapsed and certain of the test pieces had rusted entirely through, they were taken down and reweighed, after first removing all rust by a solution of ammonium citrate, which takes off the oxide without attacking the underlying iron.

Table 1 gives the results obtained on the 2 x 4-in. test pieces exposed in the coke regions, Table 2 at the sea shore, and Table 3 in the rural district. The tables are arranged to show the relative values on the basis of 100 for greatest amount of corrosion at each station, and the others in their respective values. It will be noted that in every case the steels with copper additions have shown a marked resistance to corrosion as compared with the non-copper steels, having on the average nearly twice the life. There appears to be very little difference between the grades containing 0.15 per cent. copper and those with 0.24 to 0.34 per cent., while the material with low carbon and manganese and with 0.06 to 0.07 per cent. copper take an intermediate position between the copper-bearing steels and those without copper. It will be noted that the results on the weighed test pieces check up very closely the results on the full sized sheets.

Table 1.—Showing Relative Losses on 2x4-in. Test Pieces.

Exposed in coke regions November 21, 1911, and taken down August 14, 1912. Each result is the average of six pieces.

Grade	Panel	Ga.	Analysis C.	Mn.	S.	P.	Cu.	Position	Relative losses, 100 equaling greatest corrosion
Bessemer	8	27	.05	.44	.082	.101	.23	1	39.09
Bessemer	9	27	.05	.44	.075	.099	.34	2	39.61
Bessemer	9	16	.07	.46	.069	.095	.33	3	41.57
Open hearth....	5	27	.10	.46	.035	.043	.17	4	42.09
Open hearth....	6	27	.07	.47	.038	.043	.25	5	42.22
Open hearth....	3	27	.06	.33	.035	.018	.25	6	43.27
Open hearth....	2	27	.06	.35	.036	.018	.16	7	43.92
Bessemer	8	16	.08	.45	.070	.094	.21	8	44.05
Open hearth....	6	16	.14	.46	.038	.043	.27	9	46.67
Open hearth....	5	16	.13	.44	.035	.042	.18	10	46.67
Open hearth....	3	16	.10	.35	.033	.019	.23	11	47.32
Open hearth....	2	16	.10	.34	.035	.020	.16	12	48.36
Low C. & low Mn.	10	27	.02	.03	.036	.003	.07	13	50.19
Low C. & low Mn.	10	16	.03	.03	.034	.003	.06	14	53.20
Open hearth....	4	16	.13	.45	.035	.042	.00	15	74.64
Open hearth....	4	27	.09	.47	.037	.043	.00	16	78.16
Bessemer	7	16	.08	.46	.070	.098	.00	17	91.64
Bessemer	7	27	.05	.45	.076	.100	.00	18	96.86
Open hearth....	1	16	.10	.34	.034	.019	.00	19	98.82
Open hearth....	1	27	.06	.35	.033	.018	.00	20	100.00

Table 2.—Showing Relative Losses on 2x4-in. Test Pieces.

Exposed at seashore November 28, 1911, and taken down September 7, 1912. Each result is the average of six pieces.

Grade	Panel	Ga.	Analysis C.	Mn.	S.	P.	Cu.	Position	Relative losses, 100 equaling greatest corrosion
Bessemer	9	27	.05	.44	.075	.099	.34	1	51.12
Bessemer	8	27	.05	.44	.082	.101	.23	2	51.12
Open hearth....	6	27	.07	.47	.038	.043	.25	3	51.96
Open hearth....	5	27	.10	.46	.035	.043	.17	4	55.03
Open hearth....	3	27	.06	.33	.035	.018	.25	5	55.59
Bessemer	8	16	.08	.45	.070	.094	.21	6	56.42
Bessemer	9	16	.07	.46	.069	.095	.33	7	56.70
Open hearth....	3	16	.10	.35	.033	.019	.23	8	57.54
Open hearth....	5	16	.13	.44	.035	.042	.18	9	58.94
Open hearth....	2	27	.06	.35	.036	.018	.16	10	58.94
Open hearth....	6	16	.14	.46	.038	.043	.27	11	60.90
Open hearth....	2	16	.10	.34	.035	.020	.16	12	64.81
Low C. & low Mn.	10	27	.02	.03	.036	.003	.07	13	64.81
Low C. & low Mn.	10	16	.03	.03	.034	.003	.06	14	65.37
Open hearth....	4	27	.09	.47	.037	.043	.00	15	65.60
Open hearth....	4	16	.13	.45	.035	.042	.00	16	70.39
Open hearth....	1	27	.06	.35	.033	.018	.00	17	87.99
Open hearth....	1	16	.10	.34	.034	.019	.00	18	88.83
Bessemer	7	27	.05	.45	.076	.100	.00	19	98.32
Bessemer	7	16	.08	.46	.070	.098	.00	20	100.00

Accelerated Acid Tests

Accelerated acid tests were also made on 2 x 4-in. test pieces from the same sheets as were used in the corrosion tests, and Table 4 gives the results of these tests. The copper-bearing open hearth and Bessemer steel resist the acid from 50 to 100 times as well as the non-copper steels, and within the limits of the copper contents of the steels used in this test the resistance to the acid is directly proportioned to the amount of copper present. In this regard the acid tests differ from the actual weather tests. The copper-bearing steels resist the atmosphere from 1½ to 2 times as well as the normal steels without copper, and there is little or no difference in the average between a copper content of 0.15 and 0.30 per cent.

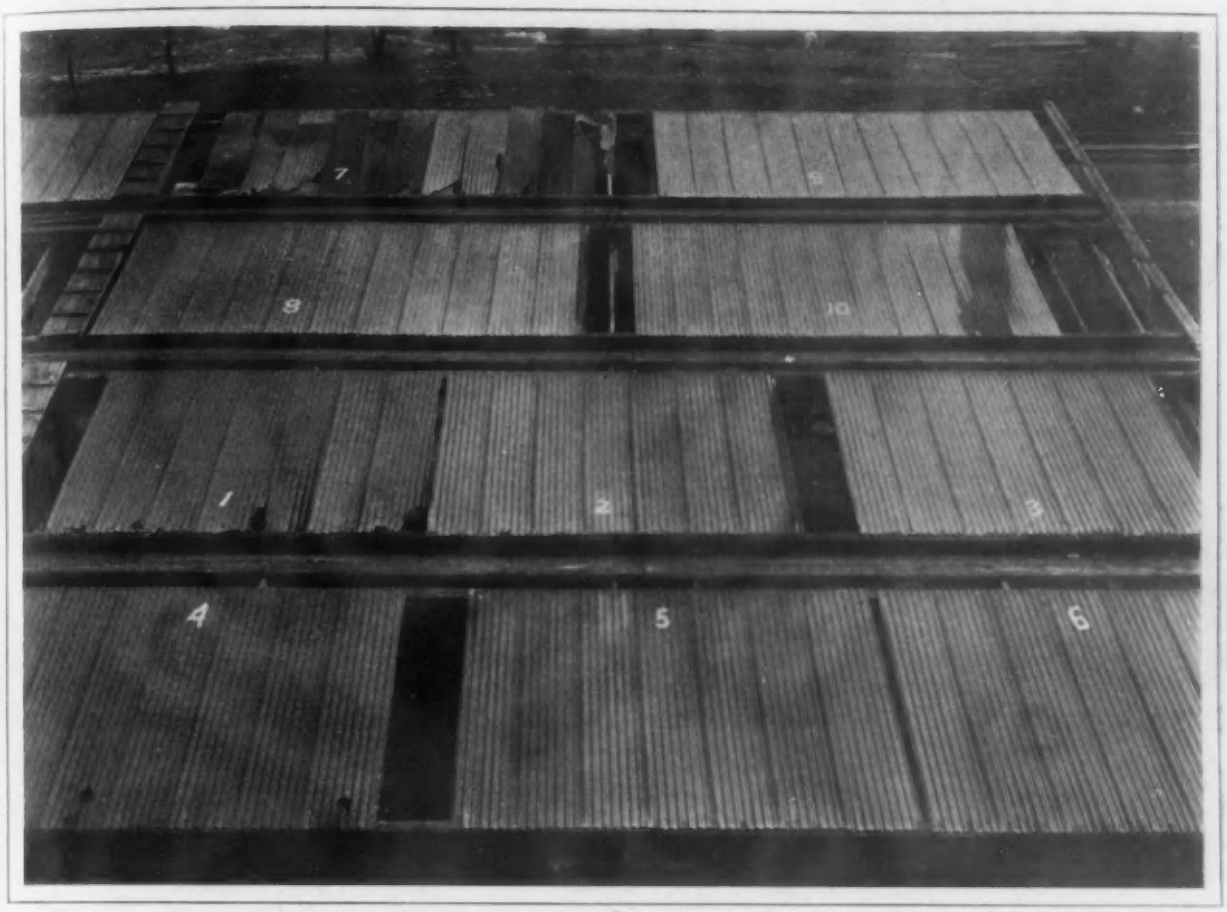


Fig. 7—Corrugated Sheets of No. 27 Gauge Placed in November, 1911, in a Rural District. Photograph Taken February 20, 1913. See Fig. 2 for Composition of Sheets

The writer has never met with a normal non-copper-bearing steel or iron which has any marked resistance to the action of sulphuric acid, neither has he found a single instance where steel carrying between 0.15 and 1 per cent. of copper did not show a very marked resistance to the same acid; indeed, the presence or absence of copper is strongly indicated by the solubility of the steel in sulphuric acid. Inasmuch as a copper content also increases the resistance to atmospheric corrosion, a certain relation is established between the accelerated acid test and natural corrosion when comparing copper-bearing with non-copper-bearing steels or irons. On the other hand, many instances have been noted and published where the results of acid tests have been directly opposite to results given by the same steels in service. We have several instances of this in the tables given with this paper. Steel No. 4 dissolved about twice as fast in acid as steel No. 1 (Table 4)—both without copper—yet it showed much greater resistance to the weather in each of the three characters of atmosphere. Steel No. 5 dissolved more than twice as fast as steel No. 2 (both copper-bearing), while at two of the test stations it gives a greater resistance to the weather. Several other inconsistencies could be pointed out, and it is the writer's opinion that the accelerated acid test used for the purpose of determining the values of steels or irons in their resistance to corrosion is untrustworthy and apt to be misleading and should be abolished; should copper-bearing steels be desired, the presence or absence of that element should be determined by chemical analysis.

It is a well-known fact that copper is electro-negative to iron, and when placed in contact with iron it will stimulate corrosion in the latter. That the reverse is true when the copper is alloyed with the iron and in solid solution in the crystal grains may be due to the alloy taking in a measure the non-corrosive properties of the copper. It has also occurred to the writer that the alloy of copper and iron is less electro-positive to the first film of rust formed than is non-copper steel, and the consequent decrease in difference of potential lessens the corrosion.

Table 3.—Showing Relative Losses on 2x4-in. Test Pieces.

Exposed in rural community December 3, 1911, and taken down November 16, 1912. Each result is the average of six pieces.

Grade	Panel	Ga.	Analysis C.	Mn.	S.	P.	Cu.	Position	Relative losses, 100 equaling greatest corrosion
Open hearth....	2	27	.06	.35	.036	.018	.16	1	51.89
Bessemer	9	27	.05	.44	.075	.099	.34	2	52.69
Open hearth....	2	16	.10	.34	.035	.020	.16	3	52.69
Bessemer	8	27	.05	.44	.082	.101	.23	4	53.88
Bessemer	9	16	.07	.46	.069	.095	.33	5	54.67
Open hearth....	3	27	.06	.33	.035	.018	.25	6	55.07
Open hearth....	5	27	.10	.46	.035	.043	.17	7	55.27
Open hearth....	5	16	.13	.44	.035	.042	.18	8	55.27
Open hearth....	6	27	.07	.47	.038	.043	.25	9	55.67
Open hearth....	3	16	.10	.35	.033	.019	.23	10	55.87
Bessemer	8	16	.08	.45	.070	.094	.21	11	57.26
Low C. & low Mn.	10	16	.03	.03	.034	.003	.06	12	57.46
Open hearth....	6	16	.14	.46	.038	.043	.27	13	58.25
Low C. & low Mn.	10	27	.02	.03	.036	.003	.07	14	64.42
Open hearth....	4	16	.13	.45	.035	.042	.00	15	68.79
Open hearth....	4	27	.09	.47	.037	.043	.00	16	71.27
Open hearth....	1	16	.10	.34	.034	.019	.00	17	76.54
Bessemer	7	16	.08	.46	.070	.098	.00	18	90.26
Open hearth....	1	27	.06	.35	.033	.018	.00	19	90.66
Bessemer	7	27	.05	.45	.076	.100	.00	20	100.00

Table 4—Comparative Tests Showing Solubility of Various Steels in 25 per cent. Sulphuric Acid at 35° C.

Grade	Ga.	Symbol	Analysis C.	Mn.	S.	P.	Cu.	Percentage loss at end of stated periods 18 hr.	36 hr.
Open hearth....	16	1	.10	.34	.034	.019	Trace	16.83	42.26
Open hearth....	16	2	.10	.34	.035	.020	.160	1.50	2.06
Open hearth....	16	3	.10	.35	.033	.019	.230	.87	1.38
Open hearth....	16	4	.13	.45	.035	.042	Trace	31.29	78.15
Open hearth....	16	5	.13	.44	.035	.042	.177	1.25	2.16
Open hearth....	16	6	.14	.46	.038	.043	.265	1.22	1.68
Bessemer	16	7	.08	.46	.070	.098	Trace	99.00	100.00
Bessemer	16	8	.08	.45	.070	.094	.207	2.09	4.40
Bessemer	16	9	.07	.46	.069	.095	.327	1.22	1.88
Low C. & low Mn.	16	10	.03	.03	.034	.003	.061	1.35	2.64
Open hearth....	27	1	.06	.35	.033	.018	Trace	41.92	100.00
Open hearth....	27	2	.06	.35	.036	.018	.160	1.28	2.04
Open hearth....	27	3	.06	.33	.035	.018	.250	.90	1.54
Open hearth....	27	4	.09	.47	.037	.043	Trace	88.23	100.00
Open hearth....	27	5	.10	.46	.035	.043	.170	2.02	4.33
Open hearth....	27	6	.07	.47	.038	.043	.250	1.29	2.06
Bessemer	27	7	.05	.45	.076	.100	Trace	100.00	.....
Bessemer	27	8	.05	.44	.082	.101	.226	1.19	2.40
Bessemer	27	9	.05	.44	.075	.099	.340	.95	1.69
Low C. & low Mn.	27	10	.02	.03	.036	.003	.069	4.75	9.08

Results are the average of four determinations on four different sheets of each grade.

Grades 1, 2 and 3 from same heat. Grades 4, 5 and 6 from same heat. Grades 7, 8 and 9 from same heat.

It has been suggested by Dr. W. H. Walker that the copper prevents the oxides of manganese and iron, which may be present, from coming out of solid solution as the steel cools, and hence, although the oxides are still present, they are held uniformly dissolved, and not segregated between the iron crystals, as is normally the case. Sufficient work has not been done to form any definite conclusions, and it is not the intention of this paper to discuss this phase of the subject at length, but rather to present results which seem to prove that a small copper content in steel (approximately 0.2 per cent.) materially increases the life of steel sheets when subjected to atmospheric corrosion.

Cutting the Cost of Power for the Factory*

Economies Effected by the Judicious Selection and Use of Electric Motors or Other Equipment—Smoke Prevention

BY STUART DEAN

Drive all small tools requiring less than 5 hp. by belts from a line shaft. Drive all tools requiring 5 hp. or more by individual motors.

Never use the group system of electric drive except in an isolated department where the group motor can be shut down half the time. For instance, the pattern shop, where the men are doing hand work most of the time and all the machines are idle a great part of the time, is a good place for the group drive.

More power is wasted and lost in driving a machine by electricity than by belts and shafting direct from the engine. This is true during the time the machine is running. When it is shut down the reverse is true, as then a great amount of power is being wasted by the shaft-drive system. To get any benefit from electric drive, the machines must be shut down a portion of the time. An individual motor-driven machine that runs continuously will have a greater power loss than that same machine driven direct from the engine through belts and shafting.

Power Loss from Engine to Tool Point

Fifteen per cent. of the energy is lost in a generator running under half load. A generator that is receiving 100 hp. from the engine will deliver but 85 hp. to the switchboard. Five per cent. of the energy is lost in transmitting the electricity through the lead wires in a plant, so that of the 85 hp. at the switchboard, but 80¾ hp. is available at the motors.

If the motors are running on one-third load, which is generally the case, the power loss, changing from electrical power to mechanical power, in the motors will be about 17½ per cent. The 80¾ hp. at the motors will drop to, roughly, 66 2/3 hp. mechanical power at the machines, a net loss of 33 1/3 per cent. from engine to driving spindle.

The loss in each pair of gears and journals will average 7 to 10 per cent. The friction in well-cut gears will absorb about 3 to 4 per cent. Adding the friction in the bearings or journals the friction in the machine will be about 7 to 8 per cent. on the average. As the gears wear the power loss increases. Thus 66 2/3 hp. at the driving pulley of old machines, will when transmitted through five pairs of gears in each machine tool, shrink to about 33 hp. at the tool points. When driving electrically therefore over two-thirds of the power is lost before it gets to the tool points. The only thing that saves the electric drive is the fact that power waste completely stops when the motors are shut down.

The loss when driving tools by shafting and belts will run about 50 per cent. in the average case. About 5 per cent. of the power can be saved by changing the oil in all the line-shaft bearings four times a year, instead of once a year. Roller bearings will cut the friction loss in half. It is practical to use them on new installations only. It is best to try a couple of roller bearings in a very hard place first for a year or two to make sure of getting a durable style. A bearing that will not wear well must be avoided, as a shut down due to trouble with the line shafting is very expensive.

Advantages of the Three-Phase Motor

Use three-phase alternating-current induction motors on all equipment except the cranes. Use direct-current motors on the cranes.

The alternating-current motor is cheaper than the direct-current motor. It will stand up to a bigger overload. The cost of repairing, when burned out from an overload, is less than the cost of repairs on a direct-current motor. The greatest point of all is that the alternating-current motor requires no more attention or expense for up-keep than the old-fashioned grindstone. Two ring-oiling bearings are the only points of wear. The electric current goes into the stationary part of the machine only. The revolving part of the machine has no wire on it at all, so that the troublesome brushes and commutator are entirely eliminated. A plant fully equipped with alternating-current induction motors will have no trouble, whereas one equipped with direct-current motors, especially where there is iron dust in the air, will have to keep a man continually busy repairing short circuits on the commutators and fixing up the brushes.

Alternating-current motors are not adaptable to variable speed, and for this reason they are not satisfactory for cranes or for doing work where they have to be run slowly at times; but for all other work, they are ideal.

Motor Costs and Efficiencies

A 5-hp. alternating-current motor costing $64 will safely do the work of a 7½-hp. direct-current motor costing $156. A 7½-hp. alternating-current motor costing $121.50 will do the work of a 10-hp. direct-current motor costing $166. The reason for this is because there is nothing on an alternating-current motor to spark and burn. Alternating-current motors of 5 hp. and smaller require no starting boxes. For this reason they are cheaper per horsepower than larger motors.

I know of a firm which buys nothing but 5-hp. motors, or smaller. They put two motors on one machine if they find that one motor fails to pull. Two 5-hp. motors cost $128. One 10-hp. motor costs $166.

A destructive overload on an alternating-current motor makes itself evident in the shape of heat in the rotor. The solder starts to fly out into the field winding. A 75-hp. motor, if burned out will cost only $40 to repair, so that it is best to risk putting in motors that are a little small for the work to save first cost, and thus get a better power efficiency. The overloaded motor uses electricity economically. The motor running light is extravagant in the use of electricity.

The makers will guarantee motors to stand a 25 per cent. overload for 2 hours. Motors will actually stand an overload of 25 per cent. for 4 hours; 50 per cent. for 1 hour, and 75 per cent. for 10 minutes. This would mean that a 7½-hp. motor can deliver 9.4 hp. for 4 hours; 11.3 hp. for 1 hour and 13.1 hp. for 10 minutes.

 Eighteenth article on Shop and Foundry Management. The seventeenth article, "Cost Keeping in a Pump Factory," was printed in the issue of April 3.

The efficiency of a motor is the percentage of the electric energy delivered to the motor that is turned into mechanical energy.

The efficiency of a 7½-hp. motor on different loads is:

1/10 load, or ¾ hp	about 60	per cent.
⅓ load, or 2½ hp	about 82½	per cent.
⅔ load, or 5½ hp	about 88	per cent.
Full load, or 7½ hp	about 88	per cent.
¼ overload, or 9.4 hp	about 87	per cent.
½ overload, or 11.3 hp	about 87	per cent.

Larger motors have slightly better efficiency; thus the efficiency of a 75-hp. motor is:

½ load, or 37½ hp	89	per cent.
¾ load, or 57 hp	90	per cent.
Full load, or 75 hp	90	per cent.
¼ overload, 94 hp	89	per cent.

The efficiency of direct-current motors is about the same as that of alternating-current motors. The same is true of generators. An alternating-current generator will stand a 50 per cent. overload for 2 hours; 75 per cent. overload for 1 hour and a 100 per cent. overload for 1 second.

The following efficiencies can be obtained with generators:

	Efficiency, per cent.	
Percentage of full load	30-kw. generator	50-kw. generator
100	87.4	90.5
75	86.0	89.0
50	85.5	85.0
25	81.0	83.0
10	50.0	50.0

When figuring on the size of an alternating-current generator to be used for driving motors, a margin must be allowed for power factor. A larger generator has to be installed than would be necessary if there was no such thing as power factor. Power factor does not increase the load on the engine. Its effect is purely local in the generator.

A plant with a 100-hp. compound condensing engine run in a somewhat slipshod way, with the engine in rather bad condition, the boiler setting leaking air more or less, the feed water not heated with steam from the auxiliaries, can make power for less than 2 cents per kilowatt hour.

Smoke Prevention

Smoke can be prevented or reduced by the observance of a few simple rules.

1.—Fire five shovels of coal on one side of the furnace, covering the fire evenly and keeping the fire level. Five minutes later five shovels of coal should be fired on the other side in the same way. Keep this up as long as the demand for steam is heavy. As the demand for power decreases, reduce the number of shovels at each of the 5-minute periods, but *do not lengthen the space of time* between firings, until the call for power is so light that two shovelfulls are enough every 5 minutes. If this rate of firing still gives too much steam, lengthen the time between firings. After each firing leave the fire door open about 2 in. for 1 minute, or until the smoke-producing gases have left the coal.

2.—Shake the shaker-grate once an hour. Do not overdo this, otherwise the grate bars will be burnt, and unburned coal wasted through the grate.

3.—Clean the boiler flues once a day, either before starting in the morning or during the noon hour.

The foregoing rules of firing will reduce smoke to practically nothing, and will keep the fires clean, which is economical of coal.

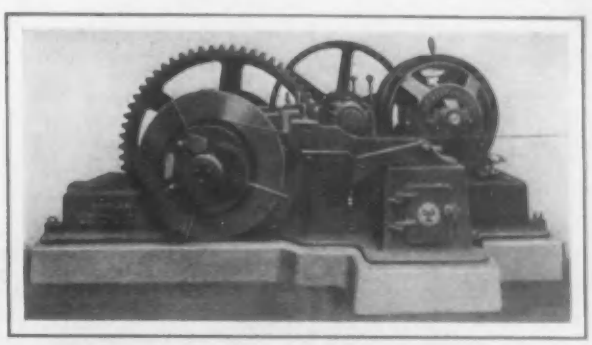
It is a good idea to rig up an alarm clock to ring electrically every 5 minutes to notify the fireman of the exact firing time. Solder a long finger on the minute-hand setting knob at the back of the clock. Arrange this finger to make the electric contact at 5-minute intervals to ring a bell.

The Associated Foundry Foremen of Philadelphia held their regular monthly meeting in that city on the evening of April 9. After a discussion on general foundry practice, Thomas Devlin, president of the Philadelphia Foundrymen's Association, made an interesting address.

A Motor-Driven Cold-Wire-Drawing Bull Frame

For cold drawing steel wire in sizes from ½ to 1 in. in diameter, the Morgan Construction Company, Worcester, Mass., has brought out a motor-driven horizontal bull frame. Two of the features of the machine, aside from the application of a constant torque during the time the wire is being drawn, are the use of a coil friction clutch inclosed in the base of the block and the use of two independently driven blocks. It is pointed out that in the operation of a machine of this nature continuous and uniform running is an important contributing factor to the securing of a homogeneous texture in the finished product, and for this reason individual motor drive is advantageous because a constant torque is applied during the time the wire is being drawn.

The machine is equipped with two blocks, one on each end of the main spindle, which is driven through a gear train. The blocks with which the machine is generally equipped do not differ materially from the wire drawing blocks ordinarily employed, but the one illustrated is of a special design for drawing rectangular stock. Other blocks can be provided for handling rectangular and hexagonal stock, ovals and other shapes which would be difficult to draw on an ordinary type of block.



A Horizontal Bull Frame for Cold Drawing Steel Wire Equipped with Motor Drive

In this machine, each block is operated as an independent machine by its own wire drawer. A coil friction clutch inclosed in the base of the block, which can be disengaged at any time by a conveniently located hand lever with very little effort on the part of the operator, is a feature of the machine. This arrangement acts as a safety device, since in case of an accident of any nature, the operator can stop the block almost instantly. Prior to the adoption of this type of drive, the only way to stop a block equipped with ordinary pin clutch was to pull out the switch and stop the entire gear train.

A Westinghouse 75-hp. direct-current motor drives the machine through a double reduction gear, the system being arranged to give a very slow travel to the block, which is 30 in. in diameter. The speed of the block varies from 10 to 20 r.p.m., according to the nature of the work being done. A double swivel die box, through which the rod is forced by a grip attached to the block, is included in the equipment of the machine. When the clutch is thrown in and the block starts to revolve, the grip automatically folds into a recess in the base of the block.

Shipbuilding in 1912-1913

Returns received by the Bureau of Navigation indicate that the current fiscal year will show an output of American shipyards greater than for any of the past four years, and equal to the average annual output for any series of active years of construction. For the nine months ended March 31 the merchant vessels built in the United States and officially numbered comprised 1114, of 260,265 gross tons, compared with 1051 of 151,341 tons for the previous corresponding nine months. As the spring and early summer are generally the season of greatest progress, the output for the year will probably reach 400,000 tons. Steel steamers built aggregate 151,507 tons, compared with 75,507 tons for the corresponding nine months a year ago. Shipbuilding on the Great Lakes shows little change, but the total output on the Atlantic seaboard has increased from 64,522 tons to 161,061 tons. Wood sailing vessels show a decrease and form only a small fraction —11,971 tons—of the total for the United States.

Improvements in the Lo-Swing Lathe

Important Changes Made in a Machine Specializing on Small Diameter Work

The Fitchburg Machine Works, Fitchburg, Mass., has made a number of improvements in its Lo-Swing lathe which are of importance in increasing the facility of operation and the range of usefulness. This machine specializes on the turning of work up to 3½ in. in diameter. It is stated that 90 per cent. of the shafts having several shoulders and one or more tapers come within this limit and the lathe is particularly adapted to producing these variations of sizes and shapes. The machine is of massive construction and throughout its design the effort has been to remove all possible vibration under the severest cutting strains, which has been made possible by limiting the scope to comparatively small diameters. The improvements include tool holders and a taper attachment of a new design, a simpler and easier control of the gear box mechanism, a roller bearing thrust collar on the spindle, the swivel drive with a double-tail dog for high-speed work on heavy cuts and a design of automatic measuring device which corrects all errors in length of stock or depth of centers so that all parts turned are duplicates. A view of the lathe in its new form is given in Fig. 1, while details of the wedge type tool holder are shown in Fig. 2. A tool holder in which three tools are moved simultaneously and the new taper attachment are shown in Figs. 3 and 4 respectively, and Fig. 5 is a sectional elevation of the taper attachment.

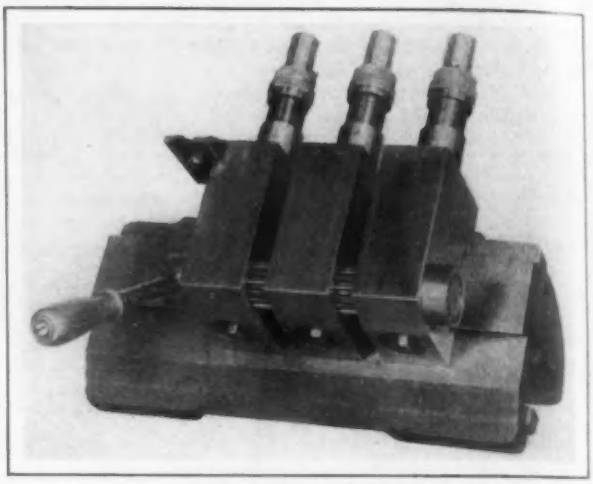


Fig. 3—A Tool Holder in Which Three Tools are Moved Simultaneously by the Lever at the Left.

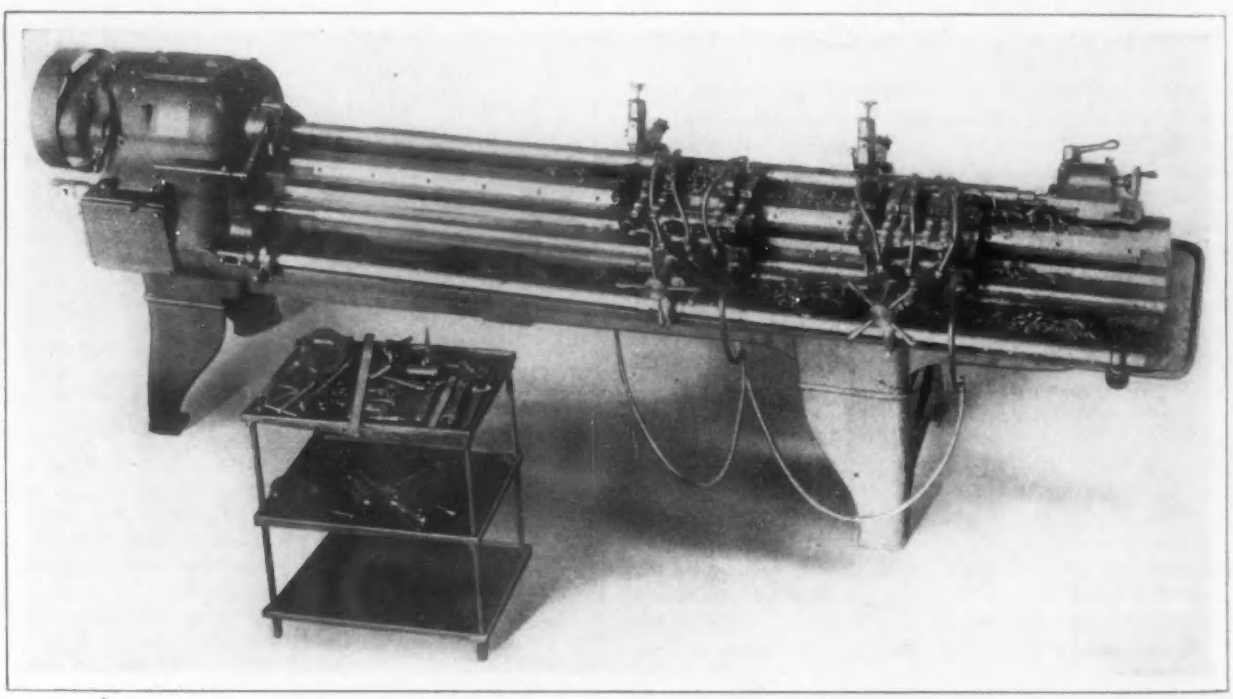


Fig. 1—The Improved Type of Lo-Swing Lathe for Small Diameter Work

The improved tool holder is a solid block of steel chased out for the feed screw and broached for the tool and gib block. The cutting tool *a*, Fig. 2, which is of high speed steel, has a sliding fit in the tool block. The circular T-head fits the inner end of the tool adjusting screw *b* which always bears directly against the butt of the tool in the same horizontal line and takes all the thrust or working stress. The holder has a wedged shaped gib-block *c* that is directly over the tool. Under ordinary conditions, the tool is permitted to depend upon its sliding fit in the block, but it can be clamped by a quarter turn of the screw *d*, making it absolutely rigid in the block and eliminating any chance of vibration. The tool screw has a dial, *e*, which permits of very accurate adjustment. In practice when beginning a lot of parts the tool is brought into contact with a test piece and the dial is set for this depth of cut. A test is made of the first piece of work and any necessary corrections made, after which the lot goes forward, the dial permitting the bringing of the tool to the exact depth required.

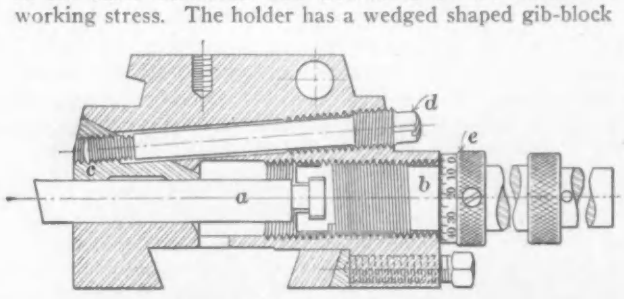


Fig. 2—Details of the Wedge Type Tool Holder

In Fig. 3 is shown a combination tool holder, in which the several tool screws are operated by a lever through a long pinion engaging with a rack on each. A great variety of tool holders for special purposes have been brought to enable the lathe to be used on a wide range of work.

The taper attachment of the machine, an exterior view of which is given in Fig. 4 and a sectional elevation in Fig. 5, consists of a bracket locked to the ways and a taper template of the desired form attached thereto. The special tool holder of the carriage bears directly against the template which regulates the varying depth of the cut while the tool moves with the carriage. A spring plunger which is solid with the tool slide shoe keeps it in contact with the template. The template bracket moves in unison with the stop rod, maintaining the same relations of taper to shoulders for all pieces turned with a given adjustment.

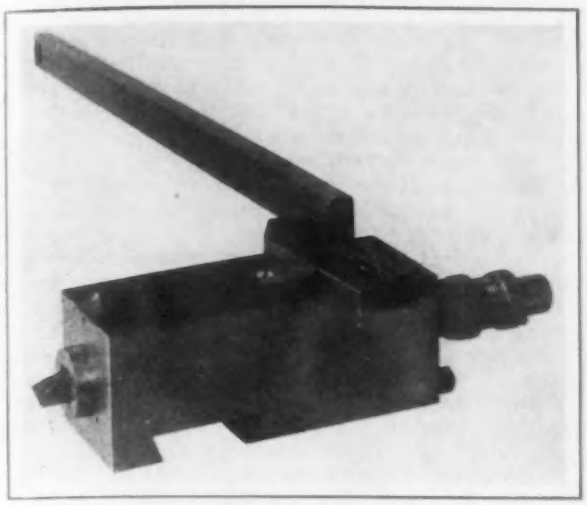


Fig. 4—Exterior View of the Taper Attachment

For turning irregular or curved shapes, such as handles and balls, a template having the desired curve is substituted for the straight taper.

The feed changes in the feed box are effected by swinging handles which operate a sliding fork through a rack and gear segment. These handles are pivoted on the segment rod to give a swinging action and each has a pin which stops in a hole in the gear case at each of the three positions.

The automatic measuring device consists of a pointer, which can be seen at the headstock end of the work in

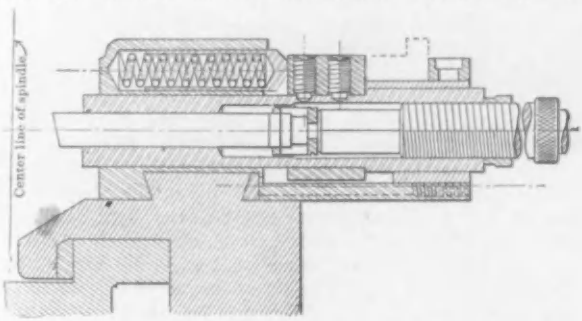


Fig. 5—A Sectional Elevation of the Taper Attachment

Fig. 1. This pointer is arranged to swing back out of position when not in use. The reading of the indicator is from a center line and is said to be exceedingly accurate.

Lake Superior Iron Ore Analyses

Secretary W. L. Tinker, Rockefeller Building, Cleveland, has issued the annual booklet of the Lake Superior Iron Ore Association showing complete average cargo analyses of Lake ores for the season of 1912, and those expected for 1913. Analyses are given of 279 ores as against 275 in the booklet for last year. The Cuyuna range appears for the first time, being represented by the Barrows and Pennington ores, the former running 56 per cent. iron and 0.494 phosphorus, and the latter 58 per cent. iron and 0.233 phosphorus. Under Canadian ores, in addition to the Michipicoten and Sudbury districts heretofore given, Hastings County is listed, being represented by a magnetic concentrate of the following analysis, dried: iron 59 per cent.; phosphorus, 0.025 per cent.; silica, 6.94 per cent.; manganese, 0.06 per cent.; alumina, 1.20 per cent.; lime, 6.21 per cent.; magnesia, 3.01 per cent.; sulphur, 0.20 per cent.

Mr. Tinker recently prepared tables showing that while for ten years there had been a decline in the average iron content of Lake Superior ores, this decline was arrested in 1912, that year showing an increase for all ranges from 51.88 per cent. in 1911 to 51.96 per cent., or 8/100 of 1 per cent. In 1902 the average iron content, natural, for Bessemer and non-Bessemer ores of all ranges was 56.22 per cent., the average annual decrease down to 1911 being about half a point. Low grade, silicious and manganiferous ores were omitted from the calculation.

Keeping Regenerator Checkers Clean

An Improvement in Open Hearth Practice

A patent has recently been issued to N. E. Maccallum, Phoenixville, Pa., on a process for keeping regenerator checkers free from oxide of iron deposits. The process, which is simple, consists of arranging the flues of the furnace in such a way that the gas may be passed into the furnace through either the gas regenerator or air regenerator, and the air vice versa.

Most operators are familiar with the fact that the checkers in gas chambers do not clog up while those in the air chambers do. It would appear, as both air and gas chambers are exposed to the same condition on the outgoing end, that one should clog up as quickly as the other, but it must be borne in mind that when the furnace is reversed the conditions in the two chambers are totally changed, namely, the air chamber still remains under an oxidizing condition but the gas chamber is filled with a powerful reducing gas, and the oxide of iron that had been deposited is reduced to a lower oxide and forms a fusible compound with the silica of the brick. By arranging the furnace as above stated, and occasionally passing the gas through the air chamber and the air through the gas chamber, it is possible to lengthen the life of checkerwork in the regenerator 200 to 300 per cent.

The first furnace operated on this principle was furnace C of the Phoenix Iron Company's plant. This furnace has already been described in technical and other journals, but no mention has been made of this feature. The practice has been to run the gas through the air chambers several times on each end every week. This is usually done after most of the lime has risen to the surface of the bath. This time is selected since roof and linings are then very hot and better suited for the less keen combustion that results from the entrance of gas through air port and air through gas port. The same results could be obtained by running gas through air for several hours at the week end.

On the first run the furnace made 24,288 gross tons, when general repairing was done, and although no trouble had been experienced in running the furnace it was deemed advisable to change the checkers. On the second run 39,529 gross tons were obtained before a renewal of the checkers was necessary. The chambers on this furnace are comparatively small, and the total number of 9-in. checker bricks in all four chambers is not quite 30,000.

Guarantees of Some German Engines

Steam engines promising remarkable steam economy are being imported into this country from Germany by the Pieper Machine Company, 531 Ellicott Square, Buffalo, N. Y. One of these, a single-cylinder engine, is built to take superheated steam and a steam consumption is guaranteed of as little 12.55 lb. per indicated horse power per hour, on an engine indicating between 58 and 75 hp., operatetl condensing and 14.95 lb. when operated non-condensing. The engines are built in a range of sizes to 670 hp. with a steam consumption 10.65 lb. condensing. The machines are also built with tandem cylinders of a short type and with a range of size of 130 hp. to 1060 hp. The steam consumption, with superheated steam ranges from 10.8 to 9.15 lb. per indicated hp. per hour, and with saturated steam, 15.2 to 12.9 lb.

The Goulds Mfg. Company, Seneca Falls, N. Y., states that its Triplex pressure pumps are used in pumping oil to the thrust bearings of the great vertical generating units used in the hydroelectric plant of the Mississippi River Power Company, Keokuk, Iowa, referred to on page 661 of *The Iron Age* of March 13. These bearings are combination roller and oil pressure. As the total weight of the unit which each of these bearings has to support is 275 tons, the importance of the oil supply is apparent. The oil is delivered at a pressure of 250 lb. per sq. in., which is sufficient to lift the unit so that it floats on the oil and relieves the rollers of the load. The pumps have 6½-in. cylinders and an 8-ft. stroke. They are operated by chain drive from a line shafting.

Two New Plain Grinding Machines

Substituting Gears to Give the Speed and Feed Changes the Special Feature

Two large plain grinding machines, intended primarily for manufacturing purposes, have recently been built by the Brown & Sharpe Mfg. Company, Providence, R. I. One of the machines, which is designated as the No. 12, takes work 8 in. in diameter and 36 in. long, while the other, which is designated as the No. 16, will accommodate pieces twice as long and 2 in. larger in diameter. Several new and important features in grinding machine construction, all of which are said to increase the ease and economy of operation and result in greater production without impairing the accuracy of the product, are embodied. The most noticeable feature about these two machines is the way in which the headstock and wheel spindle speed changes and the table feed variations are secured. In common practice these are usually obtained by shifting the belts on three sets of cone pulleys on three overhead countershafts, but this construction has been considerably simplified in designing these machines by eliminating one of the shafts and all of the cone pulleys, the speed and feed changes being made by gearing in the machine. Fig. 1 is a general view of the smaller machine, while a left end elevation and a horizontal section are shown in Fig. 2.

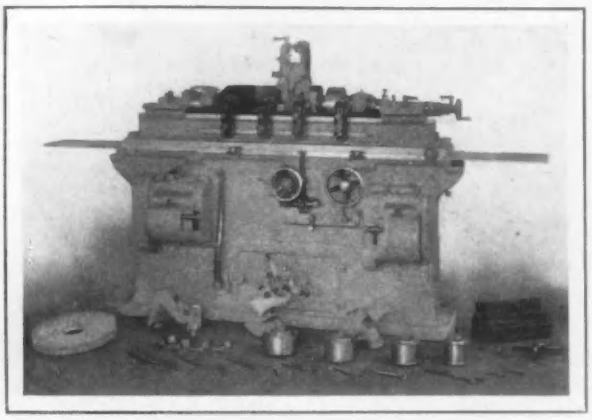


Fig. 1—A New Plain Grinding Machine Having a Capacity for Work 8 x 36 In. in Which Two Overhead Shafts and Three Cone Pulleys to Give the Feed and Speed Changes Have Been Replaced by Gearing

The beds of these machines are one-piece castings constructed with rigid, internal cross bracing and in the smaller machine there is no overhang of the ways. A rim is cast around the base to keep the waste oil and water from the floor. The table reversing mechanism is rigid and accurate and permits work to be ground close to a shoulder. The table handwheel is automatically disconnected and does not rotate when the power feed is in use, but by pressing the knob in the center of this wheel at any time during the travel of the table, the feed is stopped at the reversing point and the handwheel is engaged. In this way, it is possible for the operator to grind a shoulder on the work by using the handwheel to adjust the table and then by pulling out the knob to engage the automatic table feed and disconnect the handwheel. The arrangement for disengaging the transverse feed mechanism from the wheel slide by the small lever at the bottom of the front plate, it is emphasized, is an especially convenient feature since it permits a quick movement of the slide by a handwheel for the purpose of lubrication or adjustment when setting the wheel to the work. It is also possible to lock the pawl in the transverse feed ratchet so that when used with a stop pin a positive stop is provided. The scale for setting the swiveling table to grind tapers is graduated in degrees, in per cent. and also in inches of taper per foot. The concentration of control resulting from this new design is also a special feature. All the handles and levers to control the movements of the wheel and the work at the most economical speeds and feeds are within easy reach of the operator without moving from his position.

The wheel spindle is driven directly from a constant-speed countershaft, a set of split pulleys of several different diameters being provided for the self-aligning wheel spindle. By changing the pulleys, the different speeds are obtained without removing the belt, and in this way wheel speed changes are given directly on the machine. The slack of the belt, due to changing the pulleys and the different positions of the wheel slide, is automatically taken up and an even tension maintained by a spring-actuated idler pulley on the countershaft.

The complete separation of the work speeds and the table feeds, it is pointed out, enables the highest efficiency to be obtained at all times, as any combination of speed and feed in the entire range is instantly available, the variations being effected by gearing controlled by the simple adjustment of the index slide and levers. The gear cases are located on the front of the machine and the gears are hardened. The case on the left gives the work speed changes in revolutions per minute and the right case gives table feed changes in inches per minute. Each case consists of a cone of gears with a swinging idler arranged to mesh with a long pinion and any one of the gears in the cone with which this locks firmly. The teeth on the idler and the cone gears are of a special pointed form so that they always drop into mesh when thrown into any position.

To change the feed or speed, the locking pin of the lever on the side of the gear case is withdrawn and the lever moved as far down as possible. The index slide is then moved along until it is under the column of the index plate containing the required feed or speed. The

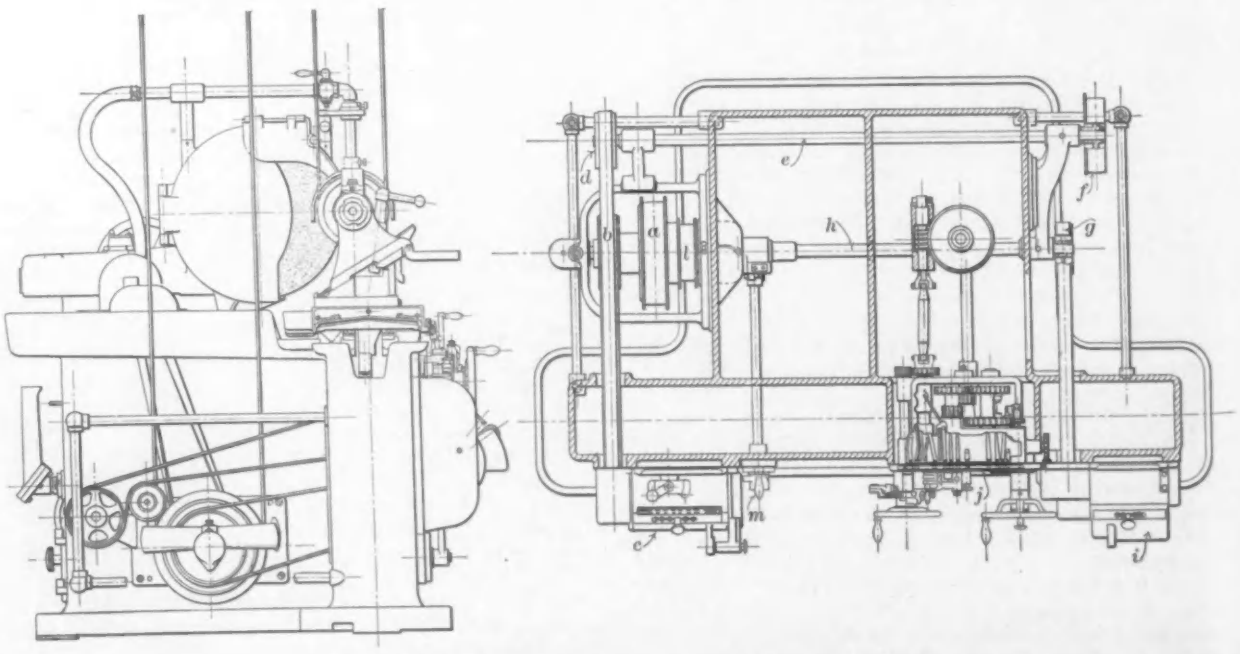


Fig. 2—Left End Elevation and Horizontal Section of the Machine

large lever is then moved up as far as it will go, the locking pin then dropping into the correct hole and the proper gears are in mesh. Two series of work speeds, one fast and one slow, are provided, their engagement being regulated by a simple movement of the lever at the top of the left gear case. A fast and slow table feed in the ratio of 3½ to 1 is instantly available in each setting for roughing and finishing work, the change being made by shifting the lever behind the table handwheel.

A simple countershaft is driven from the lineshaft at a constant speed and carries two tight pulleys, one of which drives the wheel spindle and the other the driving pulley *a*, Fig. 2. The pulley *b* transmits power to the quick change gear box *c* on the front of the bed at the left, where the changes of speed for rotating the work are made. From here, the power is carried to the pulley *d* through the shaft *e* on the rear of the machine to *f* and from there to an overhead drum which carries the belt for revolving the headstock. The pulley *g* at the right end of the driving shaft *h* which receives power from the driving pulley *a* is connected to the quick change gear box *i*, where the table feed changes are made. The gearing in this box is directly connected to the front plate *j* which carries all the mechanism for the table feed and reverse, and also the transverse feed of the wheel slide. This plate with all the gearing attached can be removed easily, thus giving ready access to the parts. The water pump is driven from *l* which is fastened to the driving pulley *a*. The lever *m* on the front of the machine operates a friction clutch within the driving pulley which disengages the shaft from the pulleys *a* and *l*, thus enabling the operator to stop the table and the work with one motion, without stopping the water pump.

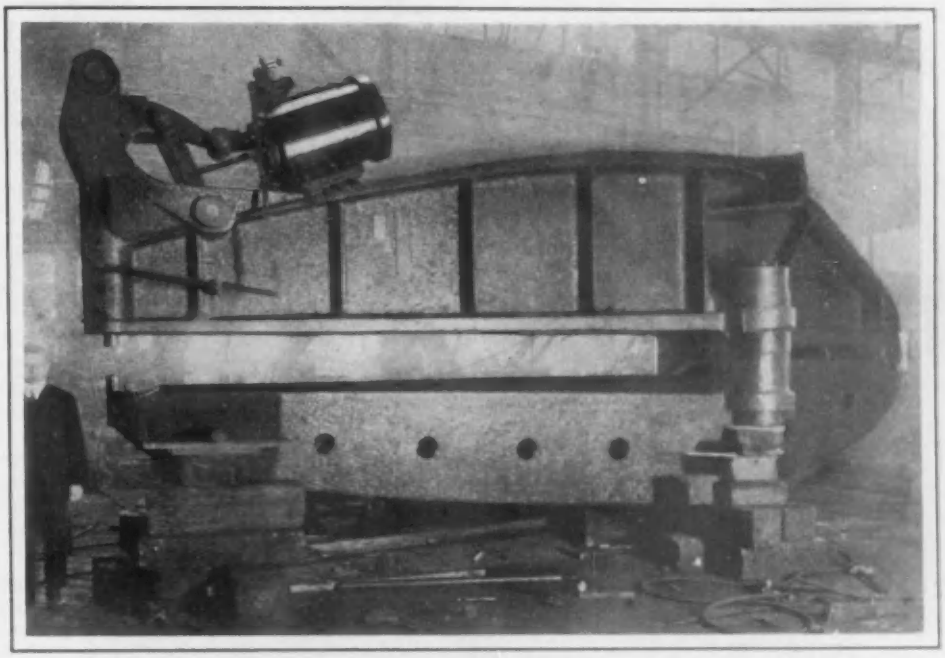
Details in Testing the Mesta Air Pump

In reporting in *The Iron Age* of April 10 of the testing of the new type of reciprocating air pump built by the Mesta Machine Company, Pittsburgh, an incorrect impression might have been taken of the procedure. The steam used in the steam cylinder of the pump was condensed and the weight of steam thus obtained was made a basis for ascertaining the performance of the pump. An interesting detail was an arrangement for admitting with the air taken by the air cylinder of a quantity of vapor, the pump being operated to simulate the conditions of actual use, when air abstracted from a condenser would naturally contain a greater or less amount of vapor. The air accepted by the air cylinder was drawn from an air tank mounted close to the air cylinder and the air was measured by the standard nozzle, as it entered the air tank. In short, the use of the air tank diminished the pulsating effect to which the nozzle or any other scheme for measurement would have been subjected were the attempt made to secure a record of the air quantities taken directly into the air cylinder, the large size of the air tank assisting to give somewhat constant conditions to the measuring nozzle. A nozzle was also provided for measuring the vapor mixed with the air, the vapor being admitted to the air tank as stated.

On April 21 the 50,000-ton Aquitania of the Cunard line, will be launched at Clydebank, Greenock, Scotland. The new steamship will be the largest vessel ever floated from a British shipyard. The builders are John Brown & Co.

Riveting Machine for Transformer Cases

A large compression yoke riveting machine was recently shipped by the Hanna Engineering Works, Chicago, to the General Electric Company for use in the riveting of transformer cases in its Pittsfield, Mass., shops. This machine operates on the principle of a toggle leverage action followed by a plain lever action. Among the special advantages claimed are the production of a high-power riveting machine without an excessive pressure in the pipe line and the economical use of air as the motive power. What is claimed to be the principal advantage lies in the fact that the air gap is closed at a high rate of speed by reason of the toggle lever action while the setting and finishing of the rivets can be done at a very slow speed under the plain lever action. In this way it is pointed out the plates are given ample time to adjust themselves and the metal in the rivets can flow sufficiently to fill the hole and the head to set.



A Large Compression Yoke Riveting Machine for Use in the Manufacture of Transformer Cases

The movement of the plunger of the upper die is 5¾ in., 4¾ in. of this distance being traversed during the first 11 in. of the stroke of the air cylinder piston and the last inch, which is under approximately uniform pressure and movement, is traversed during the last half of the 22-in. stroke of the air cylinder piston. It is emphasized that this last inch of uniform travel and pressure gives the machine all the advantages of hydraulic riveter with the added advantage of a low air pressure for actuating the mechanism instead of an hydraulic pressure which is usually from 1000 to 1500 lb. per square inch. The machine also possesses the advantage of exhausting directly into the atmosphere without the special provision of an exhaust pipe.

Some idea of the size of this machine can be gained by comparing its hight with that of the man standing at the left. The reach of this machine is 14 ft. and the gap is 12 in. The machine weighs 56,000 lb. and exerts a pressure of 100 tons on the rivet with a 100-lb. air pressure in the cylinder. The diameter of the cylinder is 18 in. and the stroke is 22 in.

After negotiations with various by-product interests in connection with its coke oven plans, the Laclede Gas Company has placed a contract with the H. Koppers Company, Chicago, for the construction of its large by-product coke plant at the southern extremity of St. Louis, Mo. The new plant will have as its initial unit 56 ovens, with a daily capacity of 750 tons of coke. It will cover about 40 acres of a 220-acre tract and will use bituminous coal brought on barges from Pennsylvania by way of the Ohio and Mississippi rivers. The gas will largely take the place of the supply which has heretofore been gained from crude oil, whose price has risen so recently as to seriously menace profits.

Improved Recording Pressure Gauge

A Differential Type Using Pressure Applied to Opposite Sides of a Tube

Under patents recently issued to its president, William H. Bristol, the Bristol Company, Waterbury, Conn., is manufacturing a comprehensive new line of recording differential pressure gauges. These are designed for use in connection with venturi meters, pitot tubes, orifices and combinations of orifices and pitot tubes, etc., to record the velocities and volumes of air, gas, steam, water and other liquids flowing through mains and pipes. Another field in which these recorders may be used is for recording the differences and variations of liquid level in steam boilers, pressure tanks, filter beds, process kettles, etc.

The principle employed in the construction of this gauge is that one pressure is applied to the inside of the operating tube, while the other is applied to the outside, the tube being located within a closed casing. To record the movement of the pressure tube, it is necessary to transmit this motion to the outside of the pressure tube casing. Since the differential pressure to be recorded is generally small as compared with the static pressure, the amount of force required for operation is correspondingly small, and it is pointed out that it would be impracticable to use a stuffing box around the shaft passing through the pressure casing on account of the friction which would be produced. To overcome this difficulty, a frictionless sealing device is used. Fig. 1 is an exterior view of one type of these recorders and details of the interior construction of the gauge are given in Fig. 2. Fig. 3 shows the safety device provided for use with these gauges.

Fig. 1—A New Recording Differential Pressure Gauge in Which the Pressures are Applied to the Opposite Sides of the Operating Tube

At the left of Fig. 2, *a* is a pressure tube of the hollow helical type which is the standard employed in the company's recording pressure and vacuum gauges. One of the pressures, the difference of which is to be recorded, is applied to the interior of the tube through the pipe *b* and the other to the exterior through the pipe *c*. This pressure tube is entirely inclosed in a pressure tight casing, and its movement will be in proportion to the difference between the two pressures, the motion being transmitted to the recording pen arm *d* located outside of the pressure casing by the small shaft *e* through the long tubular sleeve *f*. The capillary action of the oil or liquid between the sleeve and the shaft it is claimed makes this patented joint both frictionless and pressure tight. In the central portion of this drawing a diaphragm tube, *g*, is shown in the pressure chamber of the casing *h* directly connected to one end of the rotating shaft, passing through the patented pressure seal and having its other end connected directly to the recording pen arm *i*. In this portion of the engraving are also shown a set of interlocking valves *j*, *k* and *l* which constitute a device for adapting recording differential pressure gauges to practical operating conditions. The cross valve *m* is shown in an open position connecting the two pressure pipes. The valves *j* and *k* in the pressure pipes which are shown in the closed position can be opened, thus allowing the static pressure from either pipe to be applied simultaneously to the inside and outside of the pressure tube of the operating mechanism. The interlocking member *n* can be turned through an angle of 90 deg., thus making it possible to close the valve *m* which completes the connection, so that the instrument will record the difference of the two pressures which are applied to the tube.

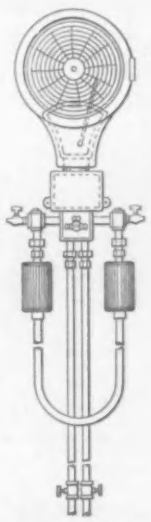


Fig. 3—The Safety Device for Use with the Recording Differential Pressure Gauge

At the right of this engraving *o* is a pressure tight casing inclosing the diaphragm pressure tube *p*, and in a similar way one pressure communicates with the interior and the other with the exterior of the tube. Its motion is transmitted by the rotating shaft *q* through the sleeve *r* to the recording pen arm *s*. The length of this sleeve is many times the diameter of the shaft passing through it, thus differentiating it from an ordinary bearing. It is stated that this device permits the recording of very small differences between the pressure existing inside and outside of the pressure tube respectively. It has also been found that the simple frictionless sealing sleeve through which the pen arm shaft passes does not produce appreciable resistance to the rotation of the shaft, and at the same time capillary attraction and adhesion prevent leakage of even high pressure from the pressure casing.

The patented safety device shown in Fig. 3 consists of a U-shaped tube partially filled with a liquid such as mercury or water. There are enlarged portions at the upper ends of this tube, having enough volume to accommodate the quantity of liquid contained in the tube. The length of the tube varies with the range of the gauge so that the maximum head of the liquid contained in the tube corresponds with the total range of differential pressure that the gauge is intended to record. If by accident the full static

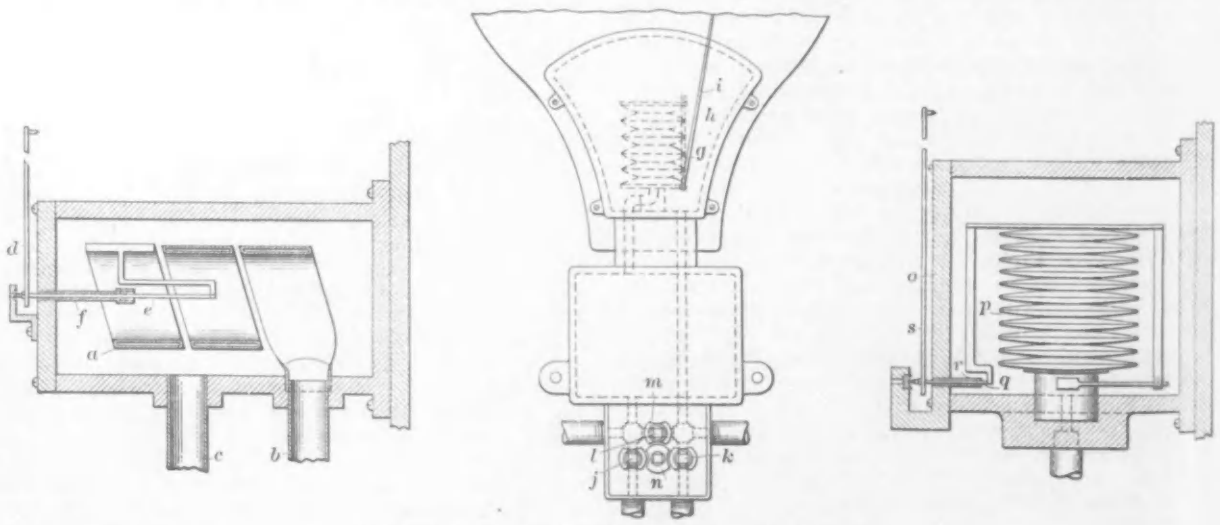


Fig. 2—Details of the Interior Construction of the Gauge

pressure should be admitted to either side of the gauge, the liquid in the tube would be instantly forced up into one of the enlarged portions, thus allowing the static pressure to be applied to both the inside and outside of the pressure tube simultaneously and protecting it from destruction.

Case Hardening at the Cambria Works

Type of Furnace and Character of Work at the Steel Plant at Johnstown, Pa.

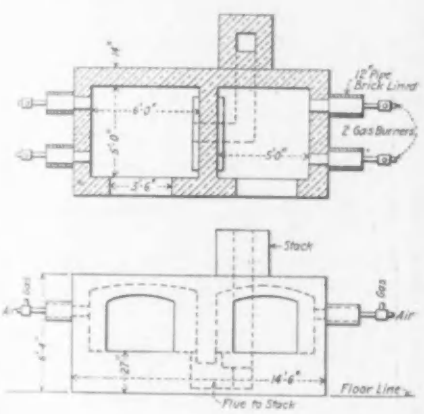
A written discussion of the paper presented at the last annual meeting of the American Society of Mechanical Engineers on the subject of case carbonizing of steel has been printed in the April journal of the society. The contribution was made by Benjamin E. Posler, assistant superintendent of the mechanical department of the Cambria Steel Company, Johnstown, Pa. The paper calling forth the discussion was presented by Marcus T. Lothrop, of the Timken Roller Bearing Company, Canton, Ohio, and was given at some length in *The Iron Age* of December 26, 1912. The notes contributed by Mr. Bosler are as follows:

The parts were case hardened at No. 1 Smith shop. About 700 or 800 bevel and spur gears for mill roller runs have been treated during the past three years, varying in size from 10 in. to 18 in. pitch diameter and about 4 in. to 5 in. width of face. Practically all crane and motor pinheat properly varies from 12 to 30 hr., depending entirely on the size of the parts being treated and the amount of penetration desired. A great amount of the work requires about 20 to 24 hr. from the time the furnace is lighted until the charge is ready to be withdrawn and quenched. This will give about 3/8 in. penetration, which is the depth reached on most of the gears.

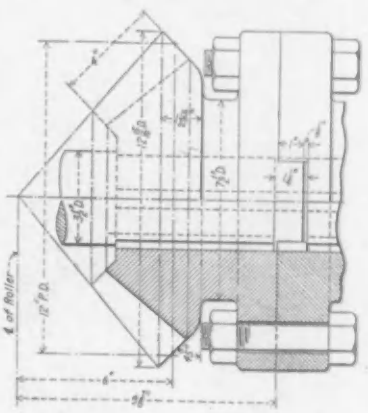
On light work the charge is usually allowed to cool before it is taken out of the carbonizing material, when it is reheated to about 1400 deg. F. and quenched in water. Nearly all of the gears and other heavy work are quenched in water direct from the packing box, a method which gives very good results and saves the cost of reheating. The temperature of the gear at the time of quenching in this case is also 1400 deg. F., as near as the operator is able to judge with the eye. It is found necessary to grind the bores of all gears after hardening, as the bore is usually slightly out of round.

Boxes made of 1-in. plate steel will last for about 15 times in the furnace before they become too thin from frequent scaling.

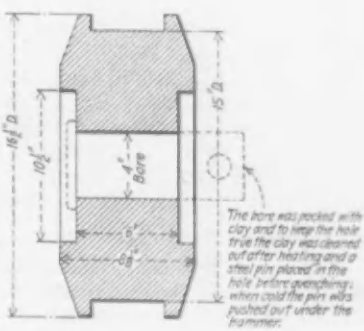
The furnace used is of very simple construction, with two heating chambers, each being supplied with two natural gas burners. No trouble whatever is experienced in maintaining an even temperature of 1800 deg. F. throughout the time the charge is in the furnace. The time required to bring the cold charge up to this temperature requires from 4 to 6 hr. A diagram of the furnace used



Furnace for Case Hardening



Half Coupling with Miter Gear; 0.12 Per Cent. Carbon



Roller Requiring About 30 Hr. for 3/16 In. Penetration

FURNACE FOR CASE HARDENING AND SOME OF THE PIECES TREATED

ions are now case hardened and a few spur gears as large as 30 in. in diameter by 8 in. face have been treated.

About 90 per cent. of the case-hardened gears are made from open-hearth steel forged blanks of dead soft stock with carbon between 0.8 and 0.12 per cent. The company has case-hardened steel with a carbon content as high as 0.20 per cent. but finds that the best results are obtained by using steel with carbon under 0.12. The other 10 per cent. of the gears treated are steel castings made to the following specifications: carbon 0.10 to 0.15 per cent.; sulphur not over 0.05; phosphorus not over 0.04; silicon 0.15 to 0.30; manganese 0.60 to 0.80.

Regarding the life of the case-hardened gears, the roller run was installed in front of the mill furnace No. 1 about four years ago where about 200 case-hardened gears were used and up to this time not one has been replaced, although the table has had very hard service. Gears in the roller runs leading up to the 18-in. mill, in the roller runs at Gautier 24-in. mill and in the tables at the Franklin mills, are giving equally good service.

Among other parts case hardened are bushings for roller bearings (ground after treated); links and chains for conveyor chains (very light penetration, about 1/64 in.); and valve motion parts and connecting rod slides for locomotive repairs.

The gears or other parts to be treated are placed in round or square boxes and packed with bone black, using about three-quarters old to about one-quarter new material. The boxes are then sealed with clay and placed in the furnace, where they are heated by natural gas to a temperature of about 1800 deg. F. The time required to and drawings of some of the pieces case hardened are shown in the accompanying illustrations.

Bethlehem Steel Company Officers

Formal announcement of recent changes in its organization, some of which have already been published, is made by the Bethlehem Steel Company, South Bethlehem, Pa. The official personnel is now as follows: C. M. Schwab, chairman of the board; E. G. Grace, president; A. Johnston, H. S. Snyder and C. A. Buck, vice-presidents; B. H. Jones, secretary and treasurer; F. A. Shick, auditor; A. D. Mixsell, general sales agent; G. H. Blakeley, manager structural steel sales and structural engineer; W. M. Tobias, purchasing agent; W. F. Roberts, general superintendent Lehigh plant; R. F. Randolph, general superintendent Saucon plant; R. P. Stout, engineer of ordnance; J. H. Ward, secretary to chairman; J. D. Hagenbuch, assistant to president; James Kernan, assistant secretary and assistant treasurer; T. O. Cole, traffic manager.

The Patterson Tool & Supply Company, Dayton, Ohio, suffered seriously by both flood and fire. Its store at 127 East Third street, comprising four floors, was burned. The company is energetically endeavoring to repair the losses and inconveniences sustained and requests all manufacturers or firms from whom it has been buying to send by first parcels post at least three catalogues, with dealers' discounts to apply.

National Metal Trades Convention

Meetings of Unusual Interest—President Sharpe Speaks on Labor Conditions and the I. W. W.—W. A. Layman Made President

The fifteenth annual convention of the National Metal Trades Association was held at the Hotel Astor, New York City, Tuesday and Wednesday, April 9 and 10. The proceedings included much that is of interest to the manufacturers of the country. The attendance was large, though many members from the Middle West had been compelled to stay at home because their presence was necessary in connection with the flood situation in that section of the country.

W. A. Layman, of the Wagner Electric Mfg. Company, St. Louis, Mo., was elected president to succeed Henry D. Sharpe. Howard D. Eells retired as treasurer after several years of most efficient service, and F. C. Caldwell, of the H. W. Caldwell & Son Company, Chicago, was elected to the office.

This meeting marked the retirement of Robert Wuest as commissioner and the formal taking up of the work by John D. Hibbard.

Important action was taken in authorizing the employment of a man to assist in the organization of an apprenticeship system in the shops of the members. The matter of amalgamating the association with the National Founders' Association came up for discussion and will be given attention in the coming year by the Executive Council.

W. A. LAYMAN
President National Metal Trades Association

President Sharpe's Report

Following the buffet luncheon Wednesday the convention opened its first session with reports of committees. The report of President Henry D. Sharpe follows:

"The movement which has come on the stage during the last two years known as the Industrial Workers of the World has naturally aroused interest in all thoughtful circles as well as apprehension in the minds of many people. Here we see the brutality of unionism carried to its logical end. To put it mildly, it has shocked people. The movement, however, has the virtue of frankness and there is nothing in its platform to cause misunderstanding or to draw the sympathy of tender-hearted people. Industrialism, or syndicalism, as it is called abroad, has no future in this country of which we should be afraid; already it has been too well advertised for its own good.

"All movements and associations for industrial betterment are imbued by certain principles of conduct upon which greater or less emphasis is laid. And in the case of unionism, whether in the form of industrialism as practiced in this country by a group of wrong-headed people or in the agitations and doings of the American Federation of Labor, there are variations of the same ideas. There are the teachings of class selfishness, the insistence of the closed shop, the curtailment of output, the encouragement of soldiering, the threatenings of those who hesitate or refuse to join unions, the employment of force, the subordination of the individual to the will of the majority, whipped into line at the behest of the agitator, the shielding of the guilty to the very end. These ideas and more too are common to both organizations.

CURBING DEPENDENCE UPON SELF

"While the I. W. W. are frank and outspoken in their position, the American Federation of Labor is wont to cloak its practices by a show of respectability, which unfortunately serves to fool many thinking people. Organizations that advocate these ideas and people who give them encouragement seem to be seriously lacking in appreciation of the necessity of conserving in our people the spirit of dependence upon self and the responsibility of the individual wherever he is a factor in our industries or even our professions. It is the problem of the American of the future.

"What behooves it for us to teach the school children that they are to grow up and become free people with the duty of performing their part in the great American electorate, and then to have borne in upon them, as soon as they go to work, that they can learn a trade only if the union permits; that their rate of pay is determined by union influence and not by achievement and the market rate; that speed of production in this age where efficiency is needed, is also to be controlled by the union, and that a sympathetic strike may be directed by the same irresponsible body? Will these ideas make for progress? Will we really be a nation of American freemen after the practice of a generation or two of this sort of education?

"Evils there are in our industrial life. No sensible manufacturer will deny the statement; but is it not possible that even some of these are exaggerated? There is probably no country on earth where a man who has to rely upon his hands and brain has a better chance to progress than here in America. And even Mr. Gompers—friend of all union men—after a tour of Europe, sees much to admire here in America as far as the lot of workers is concerned. Whatever evils there are, they are primarily the evils of a generation—evils of an overdone immigration, of a rapidly expanding commercial age, of absolute neglect of technical education in the young, of a false public school policy, of a sensational public press which elevates notoriety and shallowness at the expense of character and achievement.

"We all share in the blame for these problems of the age and we must all pull together to remedy them. Progress in industrial life, as in all else, will be made along intelligent lines and by no other way. Because of this we must believe that if we are to progress at all it must be with a different kind of unionism, shorn of these various ideas which make for the closed shop, the boycott, a compulsory minimum scale, an arbitrary working day not backed by reason, the elimination of apprentices, opposition to efficiency. With the elimination of these, unionism will be on a plane which will allow it a consideration that it does not now deserve.

EDUCATION OF THE PUBLIC

"However discouraging matters in Washington may have seemed, I am inclined to feel that developments at large have tended to hearten our association and others of allied purposes who are contending for the preservation of principles of old-fashioned American liberty in our industrial life, the importance of the open shop and oppo-

to privilege claimed by unionism. The astounding outcome of the McNamara trial and the trial, conviction and sentence of the dynamiting crew in Indianapolis are events which have greatly contributed to an aroused public opinion, as well as growing appreciation of the importance of questions presented by union practices in general.

"As time goes on, the cost of living is ever mounting upward, without any doubt greatly accelerated by the undue shortening of hours, soldiering of workers, duplication of effort and general wasting of time inculcated by unionism. Enough has been written and said about unionism and enough has been found and proved against the unions to place the American people in a condition ready to be informed still more.

"The suggestion has been made that the time is ripe for launching a substantially backed movement for carrying out a plan for disseminating accurate information about unionism as it is now conducted, which will at the same time promulgate sound governmental and economical doctrines, engendering respect for free institutions and confidence in the destination of our republic. Such an effort, if made at all, would have to be carried out in co-operation with other associations, and I suggest that you consider the giving of proper authority to the Administrative Council to effect such co-operation if, after investigation, it deems the attempt practicable. A well-conducted educational campaign of this character would be worthy of our association."

The Commissioner's Report

Robert Wuest made his final report as commissioner as follows:

"On March 1, 1912, we had 734 members in good standing. In the course of the year 38 applications for membership were favorably acted upon and 2 members reinstated. During this period 22 resignations were accepted and 16 members were dropped from the rolls on account of receiverships, bankruptcy proceedings, etc.

"It is exceedingly gratifying to note that 3025 more operatives are reported by the concerns admitted to membership during the year than were reported by the companies whose memberships were canceled. There were pending at the time of the last meeting of our Administrative Council, on April 8, 13 applications, 8 of which were accepted, also 5 resignations, making a total membership of 739 in good standing at this time. The total number of operatives reported shows a gain of 12.5 per cent.

"Our income shows an increase of 7.1 per cent. Our total expenses for the year show a decrease of 33.8 per cent. Our reserve fund at this time shows the largest balance than at the time of any previous convention."

JOHN D. HIBBARD
Commissioner National Metal Trades Association

A Gift to Robert Wuest

Mr. Wuest was presented by the officers and others of the association with a beautiful token of appreciation in the form of a book bound in tooled leather, and with vellum pages hand illuminated throughout by an artist of eminent merit. On the leaves are inscribed resolutions setting forth what the association thinks of Mr. Wuest and his work. The book contains the photographs of the past presidents and others who have been closely associated with the commissioner in the affairs of the National Metal Trades Association and the signatures of these gentlemen and others. The presentation was made by H. W. Hoyt, Great Lakes Engineering Works, Detroit, who told in eloquent words what Mr. Wuest had accomplished in his years of service. The resolutions follow:

Whereas, Robert Wuest has announced that he must retire from the office of commissioner in order to regain his health; therefore be it

Resolved, By the National Metal Trades Association in convention assembled, that we extend to Mr. Wuest the assurances of our sincere hope for his speedy rehabilitation. The services rendered this association by Mr. Wuest have been of the most satisfactory nature. During his long administration of the office of commissioner he has zealously labored for the establishment of the open shop and for the promotion of peaceful and prosperous labor conditions. The National Metal Trades Association has enjoyed remarkable growth and splendid prosperity; its efficiency in the solution of many industrial problems has notably increased; and to this growth and this efficiency Mr. Wuest has greatly contributed by his practical initiative, his rare executive ability, and by his unswerving devotion to the high purposes of the association. In his retirement he carries with him the gratitude and best wishes of his friends, the members of this association. Faithful to every trust, loyal to principle under all conditions, he has commanded our respect and invoked our praise.

Other Resolutions Adopted

Oliver Crosby, American Hoist & Derrick Company, St. Paul, Minn., introduced a resolution regarding the proposed consolidation of the National Metal Trades Association with the American Founders' Association, and this was adopted on the following day, referring the question to the Administrative Council, to come before the 1914 convention.

W. A. Lehman introduced a resolution authorizing the expenditure of $5000 in educational publicity work in the coming year and this was later accepted. W. A. Viall, Brown & Sharpe Mfg. Company, for the Apprenticeship Committee, recommended that the association employ a man whose business it shall be to assist in the organization of apprenticeship systems in the shops of its members, who shall work under the advice of and with the assistance of the Apprenticeship Committee, but who shall be responsible to the commission. The idea was accepted in the form of a resolution.

Another accepted resolution was that a recommendation in the report of President Sharpe as to the improvement in the relations between the national body and its branches, especially the qualifications of the secretaries of the branches, their appointment and the conduct of the employment bureaus, be referred to the Administrative Council for consideration and study by special committee and that the findings of said committee, when approved by the council, be put into effect as soon as practicable.

Mr. Doolittle's Paper

Most of Thursday was given up to the reading and discussion of papers. William H. Doolittle, the association's safety inspector, read a paper entitled "Luck, Law and Industrial Accidents" which in part follows:

"Accident prevention may not be accomplished without inspection. Inspections should be thorough in order that nothing dangerous may be overlooked. They should in all cases be made by competent and practical persons who have a technical and practical knowledge of dangerous places. Inspection should also be made by every person in the plant, particularly in the locality in which they are employed. Inspections should be frequent—conditions change constantly.

"When an accident happens, the first thing to be done after caring for the injured person is to investigate the cause, in order to prevent its repetition. We take issue with those persons who declare that 'accidents just happen.' Such a statement is not much more than an effort to evade responsibility. It is an unfounded and pernicious statement, tending to put a premium on carelessness and to promote accidents. Every accident is capable of analysis and in nearly every case the cause may be located. This

should be done and a record kept for future guidance. Such statistics, carefully kept, are of great value.

"Every man who has the safety of his employees at heart and every workman who desires industrial safety for himself and for his fellow workmen will give attention to happenings outside of his own plant. Machines and methods are proved to be dangerous by observing their operation and the results in different localities. The larger the field covered the more valuable will be the data gathered. Circular saws, for instance, cut, kick and kill in the same way in every part of the world. A serious accident may not have happened in a particular shop in all of its history, but this circumstance does not constitute an excuse for neglect. No plant, no industry, no locality, is immune from accidents. The most successful safety engineers profit by the experience of others.

EASY SAFEGUARDING

"There are many dangerous features of workshops that may be made comparatively safe by means of guards. It is important that set screws, gears, dead ends and all other man-killing parts of machinery be covered, inclosed or eliminated for the same reason that wild beasts are shut up or shot. All of this may be done without in the least cutting down the output of a factory; indeed, it tends to add to the output by giving the workman a sense of security. It is not enough, however, that safety devices be installed. They must be maintained. Some one must see to it that safeguards are both kept in order and in place. If for the exceptional job a guard must be removed it should be immediately replaced.

"No workman should ever enter a dangerous occupation without being made to give strict attention to the dangers connected with it. He should be made to do this not only for his own protection, but also for the sake of his fellow workmen who may be injured as a result of his lack of precaution. Every employer is morally responsible for the safety of his employees just so far as he, by the exercise of his authority, may prevent their being injured. Nor is it entirely an ethical question. It is not profitable to the employer for his workmen to be injured. Aside from the humanitarian aspect of the question, in a general way physical injuries to the workman mean financial loss to the employer.

Therefore for all of these reasons, ethical, humane and economic, the employer should instruct and warn the workman of danger. No task should ever be imposed which in its performance will endanger the life or limb of the workman. Workmen may be warned by word of mouth, by the judicious use of signs distributed about the plant and by literature. Warnings must be persisted in; otherwise they are of no avail. Many workmen are naturally careless, many others are purposely negligent, others view with suspicion efforts that have the appearance of altruism. Every possible effort should be made to secure the co-operation of the workmen in the safety movement, for progress in accident prevention beyond a certain point is utterly impossible if the opposition or indifference of the workmen to this important work is not overcome.

"In conclusion, we may affirm that luck as a factor in accidents is always more or less under the control of man; that both good and bad luck are produced by the operation of natural forces; that these forces move according to well-defined rules, or laws; and that men are lucky or unlucky just in proportion to their understanding of these laws and their disposition and ability to live and act in harmony with them."

The Annealing of Hoisting Chains

In the discussion prompted by Mr. Doolittle's paper some interesting points were brought out concerning chain annealing. In the opinion of William Lodge, Cincinnati, all chains that are used for lifting purposes should be annealed at least once in every 90 days. "Another feature that we find very necessary," he said, "is the inspection of every link of lifting chain. Of course, we all know that it is the weak links that are the cause of trouble. We have had one accident in that line."

Theodore O. Vilter, Milwaukee: I have a rule that every six months chains must be annealed. Can any one say from his experience whether it is necessary to have such annealing done, say, every three months?

Mr. Doolittle: I would say that the frequency would depend upon the amount of use. The greater the number of strains the greater disintegration is produced.

Mr. Vilter: It is very hard to keep track of the degree of use or number of times chains are used. Some are used every day; others only once in two or three weeks.

VALUE OF ANNEALING QUESTIONED

Henry D. Sharpe, Providence: We formerly annealed our hoisting chains every month, but the question arose why we should anneal them, and in order to justify ourselves in the practice or ascertain its necessity, we wrote around to various parties in the country who we thought ought to know something about chains. We could not find as the result of our inquiry anything to really justify the further annealing of chains except the fact that it had been the custom of people for decades to do such annealing. We made tests and broke the links of chains that had been in use for a considerable time. We found that the fractured chains were apparently excellent in every way, which so impressed us that we have ceased to give the same attention to the annealing of chains that we used to and now direct our attention to inspecting the links at regularly recurring intervals of time. Personally I cannot but question the practice of annealing chains every three months. No matter how much care is used there is always a danger of overheating and perhaps hurting the metal instead of refining it.

George F. Lawley, Boston: I feel as Mr. Sharpe does. I never in my experience have had any of our chains annealed. In our ship railroads our chains are subjected to all the strain that perhaps any chain would be expected to withstand, but we never think nowadays of having them annealed. When they do break it is because they have become weak and reduced to nearly half of their original size, due to the action of the salt water. I have never in my experience had one of our railroad chains break, yet I should doubt very much the wisdom or efficacy of annealing them, and I think our chains are subjected to all sorts of strains and are used constantly, yet we never think of annealing them and I question very much its propriety.

EFFECT OF REPEATED STRAINS

Mr. Doolittle: I have gone into this matter of annealing chains with an entirely unprejudiced mind, and with a desire only to ascertain the facts. Experiments for the Prussian government extending over a period of some 12 years developed the law that a strain not sufficient to break or rupture a link will do so if repeated frequently enough. We all know that we can take a piece of wire or metal and bend it once and it may not break, but if we repeat the operation we find when a certain number of applications are made that the metal undergoes a structural change which causes it to break. Reliable data as to the efficacy of chain annealing are very difficult to obtain, but I have opinions from experts whom I have consulted that I will be glad to show any of you, stating that it is wise to anneal. I appreciate the force of Mr. Sharpe's caution that annealing should be carefully done. The heating should begin slowly and be continued very gradually and not carried beyond a certain point. A very low heat will anneal steel or iron, and the cooling should be also very slowly done.

Mr. Vilter: When we anneal our chains we drop them into a 12 or 15-ton ladle, and build a wood fire on top of it, maintaining a uniform heat.

F. C. Blanchard, Bridgeport, Conn.: Mr. Doolittle spoke of the law regarding crystallization due to repeated stresses lessening the ultimate strength of the metal. Professor Lanza of the Institute of Technology, Boston, a few years ago made a number of tests bearing on this point. I bring this up as showing the value of the results he got. In order to produce repeated stresses he simply took some steel shafts and put a heavy load on them by a roller applied over the middle of the shaft so as to produce a considerable bending stress on the shaft, and in this way he got the stress that he wanted, carrying it up somewhere toward the elastic limit. When I was a student there I remember seeing in those tests a shaft running at about 300 r.p.m., and it was kept continuously running all the time the power plant was running, which was some nine hours a day. It took something like nine months to break that shaft. That was about the average of the results secured. If you figure up 300 r.p.m. for nine hours a day during nine months' running, you can see that it

would take some time before the law that has been cited would be a factor.

John W. O'Leary, Chicago: I think in discussing this matter of the annealing of chains we should keep in mind that there are chains and chains, and that the material of which they are made has a great deal of bearing on the necessity for annealing. A chain should be of good fibrous iron, and then I question very much whether annealing benefits it very materially; but a chain made of Bessemer steel I believe should be annealed, and annealed regularly. But the mere process of heating is not annealing. A great many people seem to think that in order to anneal a chain it is only necessary to throw it into a furnace or fire, paying no attention to its gradual heating, so that quite often it will be overheated. The annealing should be properly done. Nowadays we are beginning to learn that the treatment of steel should not be a matter of guesswork, so that most establishments are putting in proper furnaces and pyrometers for gauging the heat and seeing that the annealing is done as it should be. I think that a steel chain, if properly annealed, is improved thereby.

Mr. Lodge: We were astounded, after the various laws had been enacted and we became alive to the need of looking after safety devices, to find that a large number of links in all our lifting chains were defective. I think that if any of our members will take a chain and carefully examine each link at the bend they will be astonished, as we were, to find how many of them are defective and liable to cause accidents.

George L. Markland, Philadelphia: Have any of those present ever had an accident due to the breaking of chains?

M. H. Barker, Boston: We had an accident a little while ago from the breaking of a brand new chain used in hoisting material from our yard up to our railroad track. The chain broke and took a man's thumb off. I do not know how his thumb became caught in it, nor did he apparently, and he did not know that the thumb was off until after he had stopped the machine. We had that chain examined and found that the link that broke was the only bad one in the whole chain. Every other link stood up to the test except that one.

A Member: Everybody knows that after a certain length of time in use a chain should be annealed. Our practice has been always to keep an extra chain on hand and at regular intervals to have the chains annealed. We have never had an accident.

George L. Markland, Philadelphia: Mr. Doolittle referred to the fact that after repeatedly bending a wire back and forth it will finally break; but have any tests ever been made to see just how many bendings a ¼-in. wire, say, will withstand before breaking? Has anybody ever tried that to see what the effect would be?

Edwin E. Bartlett, Boston: We had an experience in our shop not many months ago, where a load in a foundry was dropped due to the breaking of a link in a chain. The metal was found to be crystallized at the point of fracture. This brought to our attention the question of annealing chains, and during the discussion we took an old chain that we had rejected and were not using in the blacksmith shop. It happened to be a light chain. We could break almost any link that we happened to select in that chain with a single blow of the hammer. After several had been broken in that way the remaining links were annealed, and after annealing it was found that the links would not break so easily, which certainly ought to prove that the annealing was effective.

H. B. McDonald, Fitchburg: Some few years ago I had an experience with saw teeth which may have a bearing on this question. We found that in the winter time we had trouble with saw teeth breaking. Such a complaint came from a little mill near us that was one of our customers, and our sales department wrote the gentleman a letter, saying that if he felt aggrieved we would like to hear from him. He came in and was turned over to me. He said that he had experienced this trouble several times. We had always gone on the belief that it was the frost getting into the material that was causing the trouble, so I took the box of teeth he had brought in for my examination, and placed them on the radiator while I meanwhile kept him busy talking. As soon as I thought they had been on the radiator long enough I said, "Well, let's go out and try them." We tried them by putting the teeth in a vise and striking them with a hammer. I struck quite a nice little blow and did not expect any adverse results, but they snapped off like pipe stems. I tried some more of them, and all the teeth that the man brought in broke readily. I was interested. I went out, the temperature being 10 degrees below zero, and put in a set of teeth that I had tried with a hammer to almost a deflex point—a very hard blow. Then I put them in a fire and heated them so as to bring them back to their original tempering heat, and they were just as good as ever. This may have a little bearing on the question.

Frank Burgess, Norfolk Downs, Mass., emphasized the duty of manufacturers to test chains properly before they are sent out.

Other Papers and Addresses

Maurice Barnett, Electro-Dynamic Company, New York City, read a paper entitled "A Plea for Profit Sharing," which was followed by a discussion, in which the general opinion as expressed was not favorable. The idea prevalent was that if the services of men are worth more than they are paid they should receive the additional compensation in the form of increased wages, rather than a sharing of the profits.

Lewis T. Bryant, Commissioner of Labor, State of New Jersey, made an interesting address on "Fire Prevention in Factories." He told of the excellent work which has been done in his State in improving general factory conditions in their relation to fire hazards, and laid special stress on the modern practice in relation to fire exits. He brought out the strong point that most beneficial results had followed the establishment of a fire chief in individual works, some employee being chosen for the position and given full responsibility as to enforcing rules which control danger from fire. The talk was illustrated by stereopticon views and included a series of moving pictures showing the operation of fire drills in factories and of factory fire departments.

William Lodge presented an interesting paper on the pension plan for employees, which is printed elsewhere in this issue. An interesting discussion followed, the feature of which was an address by M. W. Alexander, General Electric Company.

The New Officers

The report of the Nominating Committee was made by Howard P. Eells, Bucyrus Company, Cleveland, Ohio, and was accepted, officers being elected as follows: President, W. A. Layman, Wagner Electric Mfg. Company, St. Louis, Mo.; first vice-president, L. H. Kittredge, Peerless Motor Car Company, Cleveland, Ohio; second vice-president, Herbert H. Rice, Waverly Company, Indianapolis, Ind.; treasurer, F. C. Caldwell, H. W. Caldwell & Son Company, Chicago. Councillors for two years: F. K. Copeland, Sullivan Machinery Company, Chicago; John W. Harrington, Harrington & Richardson Arms Company, Worcester, Mass.; P. B. Kendig, Seneca Falls Mfg. Company, Seneca Falls, N. Y.; Justus H. Schwacke, William Sellers & Co., Inc., Philadelphia; Henry D. Sharpe, Brown & Sharpe Mfg. Company, Providence, R. I.; W. H. Van Dervoort, Root & Van Dervoort Engineering Company, East Moline, Ill. P. O. Geier, Cincinnati Milling Machine Company, was elected to fill the vacancy in the council caused by the promotion of Mr. Rice to vice-president. The other councillors whose terms do not expire until 1914 are: George Mesta, Mesta Machine Company, Pittsburgh, Pa.; Stevenson Taylor, Quintard Iron Works Company, New York City; W. M. Taylor, Chandler & Taylor Company, Indianapolis, Ind.; C. E. Whitney, Whitney Mfg. Company, Hartford, Conn.; John W. O'Leary, A. J. O'Leary & Son Company, Chicago, Ill. M. H. Barker, American Tool & Machine Company, Boston, Mass., was again elected honorary member of the council.

The last speaker was Joseph W. Pryce, Square Deal Magazine, Battle Creek, Mich., whose subject was "What's the Matter with the U. S. A.?"

Convention Committees

The convention committees announced by President Sharpe follow:

Credentials—D. M. Wright, Henry & Wright Mfg. Company, Hartford, Conn.; Winslow Blanchard, Blanchard Machine Company, Cambridge, Mass.; George D. Babcock, H. H. Franklin Mfg. Company, Syracuse, N. Y.

Resolutions—Justus H. Schwake, William Sellers & Co., Philadelphia; C. B. Wilson, Ferro Machine & Foundry Company, Cleveland, Ohio; E. A. Beaman, Beaman & Smith Company, Providence, R. I.; F. K. Copeland, Sullivan Machinery Company, Chicago; A. H. Bullard, Bullard Machine Tool Company, Bridgeport, Conn.

Constitution—H. N. Covell, Lidgerwood Mfg. Company, Brooklyn, N. Y.; John W. Harrington, Harrington & Richardson Arms Company, Worcester, Mass.; F. C. Breakspear, A. G. Spaulding & Bros. Mfg. Company, Chicopee, Mass.

Auditing—F. C. Caldwell, H. W. Caldwell & Son Company, Chicago; E. W. Heyl, Heyl & Patterson, Inc., Pittsburgh, Pa.; W. J. Kehoe, Kehoe's Iron Works, Savannah, Ga.

Convention—R. H. Jeffrey, Jeffrey Mfg. Company, Columbus, Ohio; F. Fosdick, Fitchburg Steam Engine Company, Fitchburg, Mass.; George F. Steadman, Curtis & Co. Mfg. Company, St. Louis, Mo.; Theodore O. Vilter, Vilter Mfg. Company, Milwaukee, Wis.; W. F. Koken, Koken Barbers' Supply Company, St. Louis, Mo.

The Banquet

The banquet was held at the Hotel Astor on Wednesday evening. President Sharpe was toastmaster. The speakers were Hon. W. L. Makenzie-King, Ottawa, the Canadian Minister of Labor; Charles W. Miller, United States District Attorney at Indianapolis, Ind., and Rev. Dr. W. W. Giles, East Orange, N. J. Mr. Makenzie-King made an address of especial interest. He compared the relations of employers and employees in Canada and in the United States with special relation to the adjustment of labor difficulties. He described the Canadian law of compulsory investigation of difficulties between capital and labor which has been in operation for six years. This act makes it compulsory that no strike or lockout shall occur until the dispute has been investigated by a commission of three men, one chosen by the employer, one by the employees and a third selected by the interested parties. The commission must make a careful investigation of the case and its report is given wide publicity by the Government. The result is that, whereas previously Canada had been the scene of frequent and disastrous strikes, under this law there have been but 17 strikes in six years. He dwelt strongly on the fact that public sentiment acted to prevent any strike or lockout which was in defiance of the findings of the commission.

Pension Plan for the Machinery Industry*

A Specialized System for Taking Care of Faithful Employees in Their Old Age—Essential Features Analyzed

BY WILLIAM LODGE†

In my opinion the establishing of a life pension for such of our employees as have filled all the conditions to be set forth is of vastly more importance to our workpeople as a whole than is the question of workmen's compensation. It is also of more importance to our members in general, as it will help to solve some of our problems regarding the keeping of good men in our employ. Those of us who do business in the Middle West know the restless and floating tendency of the men and the advantage of being able to keep the same set of men whom we have educated with great care and often at considerable cost. This is such a real advantage that it will pay us to adopt any reasonable plan which will secure such results. It would also tend to steady the population in our industrial centers.

Pension Plans Make Workmen Feel Comfortable

Many cases may be cited where pension plans are working out successfully, imparting a comfortable feeling to the minds of the men, and, when they know that to leave their employers means the abandonment of that pension, any change is apt to be considered very seriously. For in such a case the matter would not always be decided by the men alone, as wives and children are likely to add their influence toward having the man remain in a steady position. In fact, the benefits to both parties seem almost incalculable, and any reasonable plan should have our very careful consideration.

Any pension system should be based upon some plan that will pay the beneficiary not less than one-half the usual wage. The Government pension to common soldiers and sailors is open to many criticisms on this account.

The establishment of a pension system necessitates the setting aside of a fund that will form a nucleus and finally the capital on which the pensions may be based. If, for instance, a concern employing only 100 men should decide to set apart two cents per hour for every operator in its employ, this would mean approximately $6000 per annum on the basis of a 10-hour day. If any concern using the premium plan would put aside a like amount per hour out of the hours saved, it would double this fund, which would soon reach the point of sustaining any pension payments that need be made.

With the growing tendency toward some system of award to be paid the men, in addition to their daily rate, a portion of the savings might be placed in the fund, which would grow more rapidly than might be imagined.

The Change in the Art of Machine Making

Any employer who has maintained an efficient system of knowing the cost of manufacturing realizes the tremendous change in the art of machine making which has taken place in the last 10 years. The decreased cost of production has been largely due to the advent of high speed steel and the designing of machine tools which could use that to the best advantage. This has been hastened by the advent of the automobile, as the demand for these has made possible the development of special machinery and the lowering of cost of production. As an example, take the four-throw crank of an automobile. A comparatively few years ago this required 10 hours' time to machine the pins, while with the new and special machinery they can be turned ready for grinding in 15 minutes each.

Many other cases might be cited, but I wish to point out that, owing to the improved methods which have so materially reduced costs, we are in a position to lay aside a small portion of this saving over former costs as a basis for the pension fund. In other words, we should adopt some system that will permit the taking of a portion of the profits which have come through the adoption of more modern systems of doing business, whether these savings come from the machine shop, from the method of buying material, from the maintaining of prices against unfair competition, or in any of the many ways which are proving economical in modern business.

More Modern Systems of Doing Business

I might enumerate a few of these, such as a little closer attention to designing and to the drawings as they go into the shop; the establishment of a routing department where none is in use; the economical handling of incoming and outgoing materials; a careful tabulation of results from different departments; a good system of inspection; a clear understanding of the methods adopted by the Metal Trades Association in the handling of labor problems. An astonishing amount of saving may often be made in this way, by preventing time, money and hard feelings caused by avoidable strikes. In many cases the amount saved in a single instance of this kind would make a very respectable foundation for a pension fund.

These are only a few of the many things to be considered, my main object being to call your attention to the desirability of making a start so that a fund may be accumulated from which pensions may eventually be paid.

*Presented at the annual convention of the National Metal Trades Association, New York, April 10.

†President Lodge & Shipley Machine Tool Company, Cincinnati, Ohio.

In case any member may decide to adopt such a plan, there are a few points connected with it which it may be well to bear in mind.

The Essentials to Be Considered

1. The retiring age. My suggestion would be 65 years. But this should not be arbitrarily fixed. It should be at the discretion of the trustees handling the pension fund, as there may be cases where it is desirable to extend the limit and others where a man should be retired before reaching this age. The Pennsylvania Railroad pension plan allows retirements earlier, but not later than the age limit fixed.

2. Period of service. This should probably be at least 25 years before a man becomes eligible to receive the pension, but might also be left to the discretion of the trustees.

3. The pension fund. This should not be handled by the firm or company but by a board of trustees. This is on the advice of an eminent lawyer, on account of its being an obligation on the firm or company if so handled.

4. Apprentices. The need of a retiring age is clearly shown, as an apprentice entering the shop at 15 would be only 40 at the end of 25 years' service.

5. Number of pensioners. By going over your books you can readily see how many employees have been with you 25 years. This will give you a line on the possible number of pensioners and form a basis for the probable demand on the pension fund in the next 50 years. It must be remembered, however, that a larger percentage of employees will serve the required number of years with a pension plan in existence.

6. Adding to the pension fund. There should be a thorough threshing out of all methods of adding to the pension fund, and these should be decided upon and put in writing, with a request for suggestions from the various people interested. The question as to who should contribute to the fund should be carefully considered. My own idea is that this should be established entirely by the firm and that the men should have no part in its maintenance.

7. Amount of pension. This varies widely. Some large corporations, including railroads, both in this country and abroad, pay two per cent. of the average wage earned during the 10 years preceding retirement. Others pay one per cent. for every year of service, based on the preceding 10 years as above. This is hardly sufficient, as it necessitates a man's serving fifty years to secure half pay.

8. Special retirement. This should be provided for in cases where the man has become incapacitated through ill health before his 25 years of service have elapsed. A certificate from a physician approved by the trustees should be required in such cases.

Additional Matters for Consideration

Other cases to be considered are:

9. The continuance of the pension to the family after the death of the beneficiary.

10. Whether the fund shall be invested in municipal, State, national or railroad bonds, or otherwise.

11. Whether the beneficiary may engage in business on his own account after retirement if said business would not be objectionable to the trustees.

12. Investing the trustees with power to suspend the pension in case of gross misconduct. Should a clause of this kind be adopted, it should be very carefully worded, so that it would be impossible for any trustee to debar a man on account of any personal differences, political or otherwise. Failure to do this is sure to be construed by the men as a club which may be used to infringe personal liberty and is sure to be resented.

13. Ample provision to prevent any beneficiary having a sum set aside for his own pension.

14. A discussion as to the plan of operation of the work, in which the co-operation of the employees may be had, such as the adoption of straight piecework, premium plan, or a combination of premium and bonus plans. But, regardless of the plan adopted, some portion of it should be used for the establishment of a pension fund.

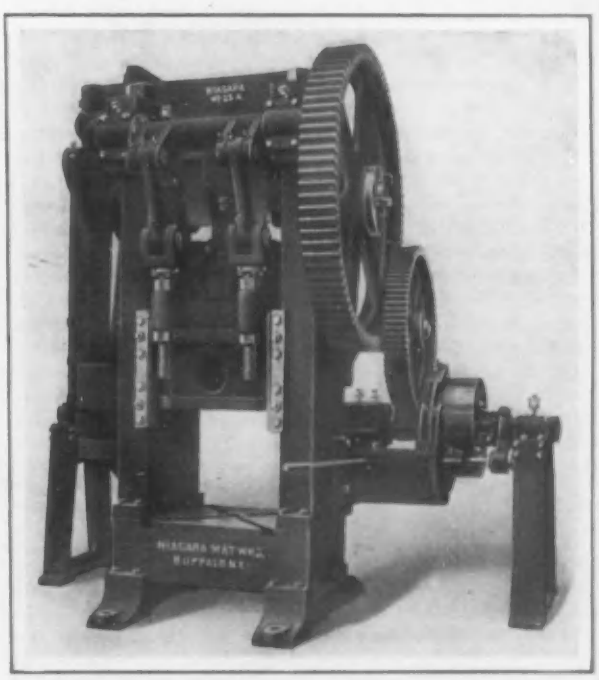
15. The possible discontinuance of the business either through death, ill health, lack of profit, or in any other way, and the disposition to be made of the pension fund in such cases. This is a question which must receive careful attention and on which your speaker will be very glad to receive the suggestions of the membership.

It should be thoroughly understood that the successful carrying out of such a plan rests with the employers alone. The whole subject is presented as a business proposition and not as a philanthropy in any way. Any company having a reliable pension system will be better able to retain its men for long periods of time. It will, I am sure, be a marked step in the advance of human progress if pension systems can be made more general.

The general adoption of some such system, taking care to point out its advantages to the men, will lessen the restlessness and decrease the floating population, will retain the men we have taken the pains to educate, will increase the value of the business itself, and cannot help but tend to make better citizens.

A Large Double-Action Toggle Drawing Press

For the large variety of work which is required in the manufacture of automobile parts, enameled ironware, steel containers and many other articles of a similar nature, the Niagara Machine & Tool Works, 639 Northland avenue, Buffalo, N. Y., has recently built a large double-action toggle drawing press. The construction of the press is particularly massive and rigid and by the use of a multiple disk friction clutch it is possible to start and stop the machine at any point of the stroke.



A Large Double-Action Toggle Drawing Press for Heavy Work, Such as Automobile Parts, Enameled Ironware, etc.

The built-up type of construction is used for the frame, which is held together by four steel tie rods that take all the strain. Four powerful toggles which receive a rocking motion from a pitman and slide on the left side of the machine operate the blankholder. The two horizontal steel rocking shafts are timed so as to give a dwell to the blankholder during the drawing period. The motion for the plunger or inner slide is transmitted from the main shaft by a pitman.

A powerful friction clutch of the multiple disk type is included in the equipment of the press. This clutch is actuated by a hand lever which permits the machine to be started or stopped at any point of its stroke. The outboard bearings of the pulley shaft have a double wedge adjustment to secure the proper alignment when mounting the press on the foundation.

The following table gives the principal dimensions and specifications of the press:

Largest blank diameter, in.	30
Largest punch diameter, in.	24
Maximum depth, in.	8½
Distance between uprights, in.	34
Stroke of plunger, in.	18
Stroke of blankholder, in.	12½
Adjustment of plunger and blankholder, in.	8½
Approximate weight, lb.	41,000

The Joint Triple Supply Convention

Indianapolis Meeting of the National Supply and Machinery Dealers, Southern Supply and Machinery Dealers and American Supply and Machinery Manufacturers

Despite difficulties in traveling and the many other inconveniences which arose from the Middle Western floods the joint triple convention of the National Supply and Machinery Dealers' Association, the Southern Supply and Machinery Dealers' Association and the American Supply and Machinery Manufacturers' Association, held in Indianapolis, Ind., April 10, 11 and 12, was splendidly attended and successful from every point of view. Nearly five hundred delegates to the three conventions were registered at the headquarters in the Claypool Hotel. Most of the visitors were from four to eleven hours late in arriving, but there were very few cancellations which could be attributed to bad railroad conditions. The city of Indianapolis, though busy in caring for flood sufferers, both within and outside of its borders, found time to extend unstinted hospitality to the members of the three associations.

Opening Session a Joint Meeting

As usual with the joint convention the first session was an open one for the members of the three organizations and the attendance was excellent. N. A. Gladding, E. C. Atkins & Co., Indianapolis, the retiring president of the American Association, presided and addresses of welcome were made by Charles W. Fairbanks, representing Governor Samuel M. Ralston; Richard Lieber, representing Mayor Lew Shank of Indianapolis, and C. C. Hanch, president Indianapolis Chamber of Commerce. The responses in behalf of the three associations were by S. M. Price, Norfolk, Va., for the Southern; W. L. Rogers, Pittsburgh, for the National, and D. K. Swartwout, Cleveland, for the American.

The following resolution, offered by Alvin M. Smith, Smith-Courtney Company, Richmond, Va., and secretary-treasurer of the Southern Association, was adopted:

Whereas, the American Supply and Machinery Manufacturers' Association, the National Supply and Machinery Dealers' Association and the Southern Supply and Machinery Dealers' Association consider banking and currency reform the most important of all economic questions that now confront our country, and in their opinion the immediate enactment of proper laws on this subject is necessary to establish and maintain confidence in the commercial world, because the present system is one that invites money panics on every occasion of commercial or financial unrest, therefore, the American Supply and Machinery Manufacturers' Association, the National Supply and Machinery Dealers' Association, and the Southern Supply and Machinery Dealers' Association hereby urgently request his Excellency, the President of the United States, and our senators and representatives in Congress to do all in their power to promote such legislation at the coming extra session of Congress and in every way possible use their every endeavor to carry out any recommendation for banking and currency reform laws that will meet the conditions that now demand a radical change.

Scope of the Sherman Law Explained

At this meeting W. Marshall Bullitt, former solicitor general of the United States, delivered an address on "Resale Prices and Price Maintenance" which was later pronounced a most illuminating presentation of the subject and referred to repeatedly at the subsequent discussions of the associations.

Mr. Bullitt first gave a history and analysis of the Sherman law in view of the fact that the subject of price maintenance and resale prices is indissolubly connected with that act. In part he said:

"The result of 20 years of gradually working out the meaning of the act by numberless special cases is three principles. First, that the act applies to railroads, to which it was at first thought it did not apply, and it applies to everybody—to individuals and corporations. That is the first thing it settled. The second thing is that it applies to every sort of contract or by-law of a corporation. The regulation of a dealers' association or of a corporate charter, and to any conceivable kind of verbal or written arrangement or any kind of agreement whatever, and finally, it will reach any sort of scheme or device, no matter how cleverly designed, how cleverly gotten up, the object of which and the necessary effect of which is to bring about those evils which were in the public mind supposed to be associated with monopoly, such as suppression of competition, the enhancement of prices, the preventing of free intercourse among States, or any undue control of any part of the commerce. These things you may take it are well settled."

Mr. Bullitt then took up the application of the Sherman law in a number of cases which have made history such as the Government proceedings against the Joint Traffic Association, the Addyston pipe case, the Northern Securities Company, which was dissolved by the Government, the famous Danbury hat case and other litigations of the kind. Bringing his subject more directly into bearing on the affairs of the members of the three associations Mr. Bullitt said:

OPINION AS TO PRICE REGULATION

"It would seem to be the law, and pretty well settled, first, that the manufacturer, of hardware, for example, would have a perfect right to make a contract with a jobber by which he would agree to sell all of his output to that particular jobber. Second, he could agree he would sell his machinery to that jobber at a certain price, say $100. He could also, I think, agree that he would not sell to any other jobber for a less price. In other words, I think it would probably be competent for a manufacturer to agree with all the jobbers and put then on an equality and that he would not sell his machinery to one jobber cheaper than another, so that all the jobbers would get his machinery at the same price. But when the manufacturer of machinery undertakes to extend that and try to make a contract with a jobber by which he binds that jobber not to sell the machinery to the retailer or the consumer at less than a price fixed by the manufacturer and thereby attempts to take away from the different jobbers the competition between themselves, you run great risk of running foul of the Sherman law. Assuming that you sell all your machinery at $100, and you make all the jobbers agree that they will not sell for less than $125, the jobber might think he might make enough profit to sell at $120, but yet under your agreement you have eliminated the competition between the jobber who wants to sell at $120 and the one who wants to sell at $125. That is what is meant by a contract in restraint of trade which the Sherman law denounces. Any arrangement by which you undertake to prevent free competition between a dealer here and one there, or a jobber here and one there, by which prices might be lowered, is liable to bring you afoul of this act.

SEES TENDENCY TO ELIMINATE MIDDLEMAN

"I am not here to criticize, to give you my opinion as to whether this is good or bad for the country, whether it is desirable or undesirable to cut prices, but simply to tell you that these are some of the results of these decisions of late years. I think that the lesson to be drawn perhaps from this whole economic tendency is one of prophecy, showing what seems to be a tendency to eliminate the middleman. But, on the other hand, taking a bird's-eye view, you will find you have in the United States this condition, that the middleman and the jobber have combined together. In the lumbermen's association, the plumbers' association and various kindred associations they have combined for self protection. They say to one another, 'We control a great deal of trade, and we will agree with the manufacturer that we will buy your stuff, but you must agree that you will not sell it to the retailer at a less price than we think proper, and if you do not do that none of us will buy from you.' That is the kind of association, the kind of middlemen's association which in the last four or five years has been broken up time and time again.

There have been innumerable instances in the last three or four years where associations of that kind have been broken up. The tendency seems to be in the working out of the Sherman law to eliminate the middleman as far as possible, so as to make competition between the manufacturers result in giving a price as low as possible to the ultimate consumer.

"Of course, many reflections might be very aptly made on that situation. It has only been 15 or 16 years ago that it was urged that the worst thing was low prices, that the country was going to the dickens because of low prices. To-day the same school of economic thought is complaining bitterly that prices are too high. So I do not mean to say whether it is good or bad, but these are the conditions that confront you and confront all associations like this. The activities of the Government in enforcing the anti-trust law have been directed toward great aggregations of capital, and the small man and the small associations have not been affected. But you should perhaps bear in mind that while this law has been established with reference to the great, striking aggregations that it may filter down and application be made to the small associations. At any rate, these are the questions that your minds might well be directed to.

OPERATES TO PROTECT RAILROAD RATES

"In conclusion let me say that a curious thing in connection with the Sherman law is this—that the one class of corporation, class of people, that are able absolutely under the law to agree on prices, as it were to fix prices and maintain them, and maintain them under the law, are the railroads, and it has resulted in a most curious thing. The Sherman law says there can be no combination in restraint of trade, yet in construing it it does not apply to the hide-bound and absolutely copper-fastened agreement between railroads, for the reason that inasmuch as the law says the railroads must publish their rates, everybody knows what they are, and if they deviate from them and give a lower rate it is known at once, with the result that if the manager of a railroad publishes a certain rate every other road in the country must come to it or the first road will get all the business. Therefore, there is no competition, there is no cutting under, and the result is that one railroad knows the rate of every other railroad, they know what every railroad has to charge, because they have to publish it, and therefore the railroads are the one class of people against whom Congress has been for years knocking, and they are the one class of people in this country for whom it is absolutely legal to agree on rates, and they have to publish their agreement. They can agree on rates and they must advertise their rates, whereas business men and manufacturers, not being required to publish their rates, are prohibited from getting together among themselves and agreeing on prices.

"This question of price maintenance and resale prices is one which the whole tendency of the courts is against, and it is difficult to say how any association of manufacturers or producers can make agreements that are valid by which their product shall be governed. They can fix prices at which they will sell, but when they undertake to decide the price at which the retailer shall sell the material in order that a desired result may be accomplished, they run afoul of the Sherman law."

D. K. Swartwout Heads Manufacturers

The separate meetings of the associations began on the afternoon of April 10 and continued both morning and afternoon April 11 and the morning of April 12, all being held at the Claypool Hotel. Attention is here given to each association in order. The American Supply and Machinery Manufacturers' Association followed its set programme with but few changes. D. K. Swartwout, Ohio Blower Company, Cleveland, Ohio, succeeded N. A. Gladding, E. C. Atkins & Co., as president. The new officers are: President, D. K. Swartwout, Ohio Blower Company, Cleveland, Ohio; first vice-president, C. H. Jenkins, Moran Flexible Steam Joint Company, Louisville, Ky.; second vice-president, Farnham Yardley, Jenkins Bros., New York, N. Y.; third vice-president, John K. Broderick, Broderick & Bascom Rope Company, St. Louis, Mo. Executive Committee: Joseph M. Hottel, chairman, Delta File Works, Philadelphia, Pa.; E. G. Buckwell, Cleveland Twist Drill Company, Cleveland, Ohio; John W. Macomb, New York Belting & Packing Company, New York, N. Y.; Fred H. Payne, Wells Brothers Company, Greenfield, Mass.; G. L. Reeves, Reeves Pulley Company, Columbus, Ind.

One of the first things done by the Executive Committee of the American Association was to contribute $100, which members quickly increased to $400, for the benefit of the Indianapolis flood sufferers, the members placing their contributions in a hat which was passed by Mrs. Fisher Andrews, Fisher & Norris, Trenton, N. J. John Trix, American Injector Company, Detroit, Mich., had started to perform this service when Mrs. Andrews arose to say that as the only woman member of the association she claimed the privilege. It was granted amid applause. The money will go to a fund to refurnish homes. At the opening meeting President Gladding's attention was called to the death, since the last meeting, of E. H. Hargraves, Cincinnati Machine Tool Company, a member of the association. The members stood in silence for a few minutes as a tribute to Mr. Hargraves's memory.

The report of the membership committee showed an addition of 30 members in the year and a total of 220. The first session was devoted entirely to the routine business and the first addresses on business topics were heard at the Friday morning session. Tim Thrift, advertising manager of the American Multigraph Sales Company, Cleveland, Ohio, was scheduled to talk on "Putting the Biz in Business," but he said his real subject would be "Putting Ginger in Salesmen," and his address largely dealt with prize contests and other devices successfully used by his company to spur salesmen on to their best. The address was highly instructive and interesting. Charles A. Brown, Lunkenheimer Company, Cincinnati, Ohio, spoke on "Uniformity in Cost Accounting," and, in part, said:

Some Phases of Foundry Cost Distribution

"In the matter of distributing the overhead charges to the cost of production, we find the factor which is less standardized than any other element of cost accounting. In foundries we find many instances where the product is treated in total only, and others where it is classified either according to the weight of the work, such as light and heavy, or according to the methods of making it, such as machine and hand-made castings. In some foundries the expense is distributed over the output as a whole, either in relation to the coremaking and molding labor or on the basis of tonnage; and in others a distinct burden is applied to each class of work. There are cases where the coremaking and molding labor is treated as an indirect charge and distributed on the tonnage basis.

"In factories, various modifications of the percentage, man-hour and machine-rate plans are most commonly employed. The percentage plan in some cases is distributed in relation to direct labor, and in others in relation to both material and labor. In many plants a general burden rate is applied over the plant as a whole, while in others the work in each department bears its own burden.

"The use of the various methods by manufacturers of different product is not to be criticized, but it does seem wrong that plants producing the same class of goods by similar processes should employ different methods. For instance, in compiling foundry costs one plant making a certain kind of product will treat coremaking and molding labor as a direct element and apply it to the units of product in the same manner as machine shop operations are usually applied, while another foundry producing work of the same nature will treat this labor in total only and distribute it on a tonnage basis. Again, one foundry will divide its product into classes and use a different tonnage charge for each, while another will apply the same charge to the entire output.

"Take any two foundries producing a similar variety of work and operating under like conditions, in one apply the cost of coremaking and molding as direct labor and in the other treat it as a tonnage charge; or use the classification scheme in one and the general charge in the other and there will be very few cases where the cost of similar units will compare. Taking several factory examples, there is apparently no reason why one manufacturer of tools, such as dies and taps, should distribute his burden according to an hourly burden plan and another manufacturer of the same line apply his overhead on the percentage basis; or why one plant producing a line of engi-

(Continued on page 971)

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CONTENTS.

The Difficulty of Getting a Profit

An Eastern metal-working company, commenting in a letter to *The Iron Age* on some phases of the business situation, says in part:

One loud complaint which we have to make is the difficulty which prevails in our particular line of getting increased prices for our work to cover the enhanced cost of materials and the constantly rising scale of wages which we have had to pay. We believe that this has been the cause of many of the insolvencies which have come to the surface in greater numbers during the past year. Those who are not systematically organized and have no accurate cost data have often suffered without their knowledge.

The complaint will find a response in many lines. Just at the time when utterances from high places are enlarging upon the profits of manufacture which are alleged to be due to favoring legislation, many who have dealt from day to day with the problems of proprietorship in the trying years since the panic of 1907 are saying that the difficulties of getting a profit have increased. Manufacturers who are buyers of iron and steel in their various forms—who make up the great metal-working industry of the country—have had no such run of prosperity in the past 18 months as has been inferred by onlookers who have read of the expansion of steel-works operations in that period. In the steel industry itself only in the past six months has there been an approach to satisfactory profits, and then only by the strongest companies, which have exceptional advantages in ownership of minerals and control of transportation facilities. And this expansion in steel has been so largely helped on by railroad buying that many manufacturers in metal-working lines not related to railroad work—as well as some that are so related—have not been able to catch step with the steel trade. They have still encountered keen competition, indicating that capacity in their particular industry was under no such strain as has been so marked in the manufacture of steel. The steel fabricating industry is a conspicuous example.

Without going here into the causes of the conditions now confronting so many manufacturers—the chief of them were indicated in the article "High Cost of Living Is High Cost of Labor" in *The Iron Age* of February 20—we cite the experience of our correspondent quoted above as typical of much that might be written by industrial leaders. It is directly at variance with the belief on which those are proceeding who are about to apply legislation to the reduction of "swollen manufacturing profits."

Statistics of Unfilled Steel Orders

Referring to the United States Steel Corporation's statements of unfilled orders, the New York Evening Post says that their utility "would be greatly increased by an accompanying statement of the month's shipments. Such a statement would make it possible to know how far a decrease in unfilled orders, as that of last month, was due to falling off in bookings, and how far it was due to increase in shipments." The March shipments from the mills would have been greater but for the flood; hence the falling off in unfilled orders—187,000 tons—was less than it would have been had not that calamity overtaken the country. The comments on the monthly statistics from time to time have indicated the prevalent belief that an increase in unfilled orders is always to be construed favorably. Yet a situation might be conceived in which a large increase

would be shown when mills had been crippled and shipments held up. In fact, pushing this way of reckoning to its limit, if all mills were closed down for a month the unfilled order statement would be at its best.

While the Steel Corporation's figures would give a more intelligent idea of conditions in the steel trade if they showed production and shipments, as the copper producers' figures do, it is generally possible to make the right interpretation of the unfilled orders statement by what is known of the pig iron production of the Steel Corporation's various subsidiaries. In spite of the flood interruption the production of steel in the quarter ending with March 1, like that of pig iron, was greater than for any three months in the country's history. That the falling off in unfilled orders has been so small since the beginning of the year indicates the taking on of new business at a very satisfactory rate, after such a year of sustained demand as was 1912. While close search has been made for evidences of declining consumption, and it has been a good many times asserted in recent months, a survey of actual developments in the steel industry does not support that view of the situation. In the nine months ending with December the Steel Corporation added 2,627,323 tons, or nearly 50 per cent, to its unfilled orders, bringing them up from 5,304,841 tons to 7,932,164 tons. In the first quarter of this year the total falling off has been 463,208 tons, or about 10 days' production. With the equivalent of more than six months' output on their books—though not all of it for delivery in that period—the Steel Corporation's mills have thus far encountered no evidences of recession, and the testimony of other steel producers is to the same effect. The statistics of unfilled orders have their uses, but standing alone they fall a good deal short of being a barometer of the country's steel consumption.

Trespassers on Industrial Properties

Occasionally report is made of an accident to an outsider who has entered on the property of a manufacturing plant, with consequent action for damages by the injured trespasser. It would seem that the trespasser goes there at his own risk, but the courts have held that under certain conditions an owner is liable. In one case boys had for years played about a railroad turntable and those in charge of it had made no effort to stop a dangerous practice. The turntable constituted an "allurement," as the legal phrase has it. A lad was injured, and the court awarded damages against the railroad company because it had freely permitted the presence of the children. No one had appreciated the possible danger to an extent sufficient to cause him to assume responsibility and put a stop to the trespass.

It is often difficult to keep out venturesome children unless the property is securely fenced. Doubt has existed as to just where the liability of owners begins in such cases. An English court has recently gone into the question with much thoroughness, and has established a precedent, which is summarized as follows:

"If a child enters upon land without invitation (although with knowledge and permission), there being no allurement or trap or dangerous object placed upon the land, and an accident happens, the landowner is not liable. So if a factory yard was constantly left open, and children were allowed to enter there without let or hindrance, no liability could be incurred unless there was some special allurement—*e. g.*, a crane with which boys could play; or a trap, *e. g.*, a pit.

"If a child enters upon land as a trespasser—that is to say, without the knowledge, consent or invitation of the owner or occupier—then the occupier is not liable, even if there is a trap or an allurement."

To see children playing on factory property is no unusual occurrence. Many owners or their representatives are easy-going in their attitude toward trespassers. They do not realize that they are inviting accident to their visitors and possible actions for damages.

An Unbiased Opinion of the Tariff Bill

An interesting article appears in the issue of April 12 of the Commercial and Financial Chronicle, New York. That journal is primarily devoted to financial matters and only incidentally takes cognizance of developments affecting manufacturing interests. Its affiliations being completely outside of the manufacturing field, whatever it says on manufacturing questions may be accepted as utterances from a perfectly disinterested standpoint. Speaking of the new tariff bill, it presents the following arraignment of the motives governing those who had in charge the preparation of the measure:

> We think that if an honest and reliable poll of the people of the United States could be taken it would be found that popular sentiment is strongly in favor of removing the duties from foodstuffs, with the view to furnishing relief from the high cost of living, and that public opinion is likewise in favor of free raw materals, so as to promote the country's manufacturing growth. Given free raw materials, some reduction in the imposts on manufactured goods, it is believed, would also be beneficial. But it is the general feeling that the revision of duties on manufactured goods should be prudently and cautiously made. The people do not want the reduction to be more than moderate, and certainly not so radical as to engender even remote fears of a possible undermining of domestic industry. It is obvious that the tariff measure now presented for consideration has not been framed with any such idea. The cuts in duties are radical in the extreme, and the whole plan appears to betray great prejudice against manufacturing industries, which itself is fatal to sound legislation in the premises. The thought apparently underlying the revisions is that these manufacturing industries have been enjoying large profits —a notion which is entirely erroneous except as to the iron and steel industry, and even there profits have been sharply declining in recent years—that such profits are to be deprecated, and therefore manufactured products furnish a legitimate field for the application of tariff reform principles of a most pronounced type.

We believe that the Chronicle is correct in its statement that "it is the general feeling that the revision of duties on manufactured goods should be prudently and cautiously made," and that it should not be "so radical as to engender even remote fears of a possible undermining of domestic industry." The fact seems well established that the feeling in the past few years had been widespread that some reduction in duties should be made. Certain schedules of the existing tariff have been sharply attacked, and on such schedules the new administration would be carrying out the wishes of the people in making a revision downward, but those who were most violent in their attacks have probably been surprised to find that the framers of the new bill seemed to feel warranted in construing these attacks as instructions to proceed to seriously destructive legislation.

In presumably carrying out the wishes of the people

in favor of lower duties, the revisionists would paralyze whole communities in subjecting to severe foreign competition the industries on which they depend. So far as the metal schedule is concerned, there was no popular demand for such drastic reductions as have been made. Iron and steel duties were cut almost to the bone when the Payne tariff was adopted in 1909. The complete removal of duties from cotton ties, wire products and steel rails was also unwarranted. This, in particular, is an example of the revisionists betraying "great prejudice against manufacturing industries."

The Chronicle proceeds to analyze quite a number of the features of the bill, stating that "in numerous instances there is positive discrimination against the home-manufactured article." It has the following remarks to make with regard to the expectation that if this bill should be passed it will be effective in reducing the high cost of living:

> How far the proposed revision of duties will go to reduce the high cost of living is problematical. Meat, potatoes, flour and quite a list of other foodstuffs are placed on the free list, which is good enough as far as it goes, but does not furnish a full measure of relief. While a ruthless hand is laid on the tariff in manufactured goods, duties on the products of the farm are handled very gingerly and one is inclined to suspect an underlying motive of political expediency dictated by a desire to placate farming interests.

The mild reference to "an underlying motive of political expediency" might have been expressed in far stronger terms. It is a question, however, whether the dominant party in Congress will be able to control its own members sufficiently to enact this bill into law without important amendments. Washington advices strongly indicate that it is likely to encounter rough treatment and may be in quite different shape when presented to the President for his signature.

An Epidemic of Strikes

A fever for striking seems to have broken out in various parts of the country and in all kinds of industries. Some of the strikes have been brought about by the pernicious agitation of labor leaders bent on creating as much trouble as possible for employers. Others appear to be due to the scarcity of common labor, which seems to have caused workingmen to feel that employers are in no position to successfully resist demands for higher wages. So annoying have some of these strikes become that certain employers have abandoned the hope of making permanently satisfactory terms and are closing their establishments. The twine factory of the International Harvester Company at Auburn, N. Y., is stated to have been lost to that city as a result of the local labor troubles. This factory was run almost exclusively on the production of twine for export and the company is now dismantling the plant with the avowed object of removing the machinery to Europe. The branch of the Federal Sugar Refining Company at Yonkers, N. Y., has been closed because of a threatened strike of the workmen and is to remain closed for an indefinite time. If a movement of this kind among employers should spread in its turn, many localities would suffer seriously. It would seem, however, that such a policy would be a quick means of putting an end to the strike epidemic.

The annual meeting of the German Foundrymen's Association will be held in Berlin May 14 to 17. The programme of papers deals largely with foundry metallurgy. There will be an excursion to the iron, steel and brass foundries of A. Borsig in Berlin-Tegel.

National Iron and Steel Labor Report

Report Now Made on Conditions as Existing in the Trade in the Year 1910

WASHINGTON, D. C., April 15.—The report of the Bureau of Labor on "conditions of employment in the iron and steel industry" has been made public, and it is contained in a volume of nearly 600 pages. The report is in compliance with a resolution of the United States Senate of June, 1910, which directed the investigation. The Senate has ordered the report printed for distribution. Concerning hours of employment, the report says in part:

"Recent investigation shows that since 1910 a number of steel companies, notably the United States Steel Corporation, have put into effect various plans by which none of their employees is required or permitted to work more than 6 days per week. Between 40 and 50 per cent. of the employees formerly working 7 days per week have been affected by these arrangements for 6-day work, but this still leaves more than 15 per cent. of the employees in the industry as a whole and more than 50 per cent. of the blast furnace workmen on a regular schedule of 7 days per week. The proportion of men working 12 hours per day has been practically unchanged except for two plants which have introduced the 8-hour system.

"Extensive interviews with workmen brought out the fact that in their opinion the arrangements for 6 days of work per week have not secured to them advantages commensurate with the loss of one day's pay each week. The day of enforced rest does not regularly give them a holiday either on Sunday or on any other day on which their fellow workmen generally are also at leisure. On any day except Sunday, the workmen say, there is nothing to do; their families are in the mills, their children at school, and their wives busy with their household duties. There is nothing to interest them at home, and there is nothing to do except to sleep all day or go to the saloons."

The report concludes that a system of three shifts of 8 hours each is the only practicable substitute for the existing schedule, summarizing as follows:

1. It gives the workman time for complete physical recuperation, companionship with his family, self-improvement, and leisure even when employed 7 days a week.

2. From the experience of English blast furnace owners who have adopted the 8-hour shift system, and from the experience in other industries, it will tend to produce a much more efficient force of workmen.

3. It affords a much more flexible working system than exists with the present schedule of working hours, particularly when the schedule of working time is affected by any of the highly complex systems of relief men for the elimination of 7-day work.

4. The 8-hour shift system can be introduced gradually and does not require a complete revolution of operation as did the plans for the elimination of 7-day work. In fact, in so far as the 8-hour shift system has as yet been introduced in the rolling mills it has come about by gradually placing the most strenuous occupations on an 8-hour shift system. In many mills at the present time men are working 12-hour and 8-hour turns side by side without any interference with the efficient operation of the mills.

5. It effectually prevents the existence of "long turns" of 24 or 18 hours, except under the unusual conditions in which long-continued work by certain special men is necessary for the preservation of property or to permit interrupted operations to be resumed.

6. It gives a workman much more time for the performance of his religious duties than the majority of the plans for the elimination of 7-day work.

The report further says: "Some increase in the rates of wages will undoubtedly be necessary. The workman will not, and in fact cannot, accept an 8-hour day at the same hourly rate now paid for 12 hours, for this would mean a reduction of one-third in his daily earnings. The average earnings of the employees in the productive occupations of the iron and steel industry are 22.3c. per hour, or $2.68 for 12 hours' work. For 8 hours' work per day at that rate only $1.78 would be received, or 12c. per day less than the common laborers now average for a 12-hour day."

Two sets of estimates are presented in the report, which seek to determine, it says, respectively:

"1. The maximum cost, arrived at on the assumption that hourly rates are so increased that the daily earnings of the workman would be the same as before.

"2. The probable cost, arrived at on the assumption, which experience and interviews with employees have shown to be sound, that a satisfactory compromise was made by paying the workmen for 8 hours' work the same amount per day that they would receive at the present hourly rates for working 10 hours per day; in other words, an increase of 25 per cent. in the present hourly rates."

The majority of the capital and the larger number of the workmen in the iron and steel industry, says the report, are under the control of a very few corporations of great size. More than 99 per cent. of the iron and steel products were manufactured in, and practically an equal proportion of the workmen are employed by, establishments owned by corporations. The men in direct control of these corporations are the presidents and managers, whose success is gauged almost entirely by the condition of the balance sheet and the regularity of the dividends. Their immediate self interest and natural inclination, therefore, lie in the establishment and maintenance of only those working conditions from which a sure and immediate profit can be foreseen. The majority of the labor force in the industry, the report continues, consists of relatively unskilled laborers, recruited from the ranks of the recent immigrants, who are generally accustomed only to rural conditions and farm work, and a large proportion of whom neither speak nor understand the language of the foremen and skilled workmen responsible for their direction and supervision.

Under the heading of "Irregularity of Employment," the report states that the iron and steel industry is more irregular in its operation and shows greater fluctuations in its labor force than any of the large industries whose demand is not seasonal. During 1910, a year of exceptionally large production, the average employee lost at least seven weeks through unemployment, sickness and accident. Only one-sixth of all the workmen had an opportunity to earn as much as $900 a year. In the blast furnaces only 32 per cent. of the workmen could have earned as much as $700 per year if they had worked 12 hours a day for 7 days a week all the time that the furnaces were in blast.

The report will probably be used as the basis of speeches by certain Senators and Representatives, and in all probability for so-called remedial legislation. W. L. C.

German Steel Production in 1912

The production of steel in Germany for 1912, as compiled by the Verein Deutscher Eisen-und Stahl-Industrieller, shows an advance of 2,282,665 tons over the previous year. The increase of 1911 over 1910 was only 1,320,695 tons. The following table gives the details of this production for 1911 and 1912 in metric tons:

	Acid Steel		Basic Steel	
	1912	1911	1912	1911
Bessemer ingots	187,179	187,359	9,794,300	8,640,164
Open hearth ingots	194,924	281,877	6,650,565	5,501,147
Steel castings	100,332	102,018	221,331	167,354

The increase is found to be almost entirely in basic steel, acid steel showing a decline of 88,819 tons, crucible steel an advance of 430 tons, and electric furnace steel an increase of 13,523 tons. The total number of works producing steel in 1912 was 121, as against 120 in 1911. There are 15 works producing electric furnace steel.

The Inland Steel Company has published a pocket handbook of instructions and rules for the prevention of accidents and the promotion of sanitation for the welfare of employees in its iron ore mines. It is 4⅛ x 6⅛ in. and contains 95 pages. The employee is required to familiarize himself with all the rules and instructions contained in the book and must certify to the fact that he has been instructed in them, also giving a pledge to obey the rules and do all in his power to avoid accidents to himself or other workers. He is required to carry a copy of the book with him at his work. In addition to a permanent safety-committee, a workmen's committee has been appointed at each mine and the committee is allowed the necessary time from work to make a thorough inspection once each week.

New York and New Jersey Metal Trades Annual

The annual meeting of the New York and New Jersey Branch, National Metal Trades Association, was held at the Astor House, New York, April 7. President Michael Fogarty presided. H. C. Hunter, secretary, submitted a report for 1912, which showed the branch to be in excellent condition. C. E. Morton, manager of the employment department, presented a most interesting report, showing 8326 registrations, 3147 applications for positions during the year and 1173 positions filled. He stated that the members are using the labor bureau more frequently and as a consequence more mechanics and of a better character are applying for positions. Mr. Lovelace, manager of the insurance department, reported that $3,680.68 had been paid in benefits to workmen disabled by accident and sickness. In addition $1,200 had been paid to the families of deceased workmen, to defray funeral expenses.

The following officers were elected: H. N. Covell, Lidgerwood Mfg. Company, president; Louis Doelling, De La Vergne Machine Company, vice-president; M. K. Bowman, Robert Gaskell & Sons, treasurer. Executive Committee: Albert Ford, Fuchs & Lang Mfg. Company; William J. Davidson, Staten Island Shipbuilding Company, and Eugene A. Riotti, Standard Motor & Construction Company. John D. Hibbard, National Commissioner, was present and gave an address, making a most favorable impression. Luncheon was served at the close of the meeting.

Steel Corporation Orders Less

A falling off of 187,758 tons in unfilled orders is shown by the United States Steel Corporation's statement for March 31, the total then being 7,468,956 tons, against 7,656,714 tons at the close of February. The decrease of 187,758 tons in March, compares with 170,654 tons in February and 104,796 tons in January, while in December there was a gain of 79,281 tons, following one of 258,502 tons in November and the remarkable one of 1,042,874 tons in October. The table below shows that with only two exceptions each month from May, 1911, to December, 1912, showed an increase in unfilled orders:

March 31, 1913	7,468,956	September 30, 1911	3,611,317
February 28, 1913	7,656,714	August 31, 1911	3,584,085
January 31, 1913	7,827,368	July 31, 1911	3,695,985
December 31, 1912	7,932,164	June 30, 1911	3,361,038
November 30, 1912	7,852,883	May 31, 1911	3,113,187
October 31, 1912	7,594,381	April 30, 1911	3,218,704
September 30, 1912	6,551,507	March 31, 1911	3,447,301
August 31, 1912	6,163,375	February 28, 1911	3,400,543
July 31, 1912	5,957,079	January 31, 1911	3,110,919
June 30, 1912	5,807,346	December 31, 1910	2,674,757
May 31, 1912	5,750,983	December 31, 1909	5,927,031
April 30, 1912	5,664,885	December 31, 1908	3,603,527
March 31, 1912	5,304,841	December 31, 1907	4,624,552
February 29, 1912	5,454,200	December 31, 1906	8,489,719
January 31, 1912	5,379,721	December 31, 1905	7,605,086
December 31, 1911	5,084,761	December 31, 1904	4,696,203
November 30, 1911	4,141,955	December 31, 1903	3,215,123
October 31, 1911	3,694,328	December 31, 1902	5,347,522

American Steel Manufacturers' Association

The Association of American Steel Manufacturers held its annual meeting April 8 in Pittsburgh. The president, A. A. Stevenson, who is vice-president of the Standard Steel Works Company, was re-elected, as was also the vice-president, P. E. Carhart, inspecting engineer of the Illinois Steel Company. Frank A. Robbins, Jr., Pennsylvania Steel Company, was elected secretary. A silver coffee service was presented to the retiring secretary, Jesse J. Shuman who has held the position for seven years.

The membership now includes 34 important companies, recent additions being the Phœnix Iron Company and the Youngstown Sheet & Tube Company. During the past year new or revised manufacturers' standard specifications were adopted and published for reinforcement bars rolled from billets, rail steel reinforcement bars, structural and boiler steel, and blooms, billets and slabs for forging purposes; also standard methods of sampling for check analysis.

The National Association of Stove Manufacturers will hold its forty-second annual meeting in the Hotel Astor, New York, on Wednesday and Thursday, May 14 and 15. Abram C. Mott, Philadelphia, is president and E. C. Hanrahan, Chicago, is secretary. The Stove Manufacturers' National Defense Association, as usual, will hold its annual meeting at the same place on the preceding day.

The Iron and Metal Markets

Pig Iron Goes Lower

But Buying Is Generally Postponed

Large Standard Oil Contract for Plates—Advance in Steel Pipe

The decline in pig iron has been more marked in the past week, low prices which were exceptional before being now generally quoted. The effect has not been the same on all consumers. A few have bought, perhaps on the theory that the average buyer recognizes the bottom after a rebound from it, but the great majority take the view that prices will go lower.

It has been assumed that the Central Western floods by cutting down pig-iron output more than they cut down consumption would bring a firmer market; on the contrary, weakness has been more pronounced. In Ohio, foundry iron has declined about 50 cents to $15.50 at furnace for No. 2 iron.

Eastern markets have been more active, due to buying by larger consumers. Virginia iron has shaded $15 at furnace for No. 2 X. Eastern Pennsylvania furnaces have gone below $16.25 and Buffalo furnaces on competitive business in New England have gone close to $15.50, Buffalo.

Southern foundry iron, which for some time has sold at $12.50, Birmingham, for No. 2 for early delivery, is now on that basis for the second half. In the Chicago district competition from the South has been met by cutting in local irons, but buyers there are holding off.

An eastern Pennsylvania steel company came into the market this week for 35,000 to 40,000 tons of basic iron for delivery up to September 1, bringing out a price of $16.50 delivered, or 50 cents below the last transaction. On this basis the business will be divided among five or six producers. At Pittsburgh basic iron can now be had at $15.75 at Valley furnace. A sale of 5000 tons of Bessemer iron for early delivery was made at $17 at Valley furnace.

The steel trade has found the floods a very much smaller market factor than was expected. Railroad demand for quick shipment cut no large figure, but jobbers in the Chicago district have been called upon to ship far afield to supply the urgent wants of consumers whose mill connections were cut off.

The Standard Oil Company has contracted with Steel Corporation mills for 100,000 tons of plates and other material, covering its wants for tanks, pipe lines and other work for the remainder of the year. A similar order last year was for but 40,000 tons. In the Eastern plate market the extra of $1 for universal plates for early delivery has disappeared. The mills able to ship within two months still maintain 1.60c. Pittsburgh.

An advance of a half point, or about $1 a ton, in steel pipe by the largest producer, effective April 12, has been followed by the independent companies. There had been some slight cutting of pipe prices and the treatment resorted to is like that recently administered under similar conditions in the wire trade. The spring demand for pipe and tubes has been good and jobbers have been restocking. For the Chile Exploration Company an order has been given for 40 miles of 20-in. and 33 miles of 4-in. pipe.

Rail buying is small but the mills are being pressed for spring deliveries. For the Newfoundland Railways 6000 tons has been placed, and at Chicago a Western road has just bought 5600 tons. New car business has been quiet for some weeks, but the Grand Trunk has just ordered 4600 and the B. & O. 1500. The Wabash will buy 950 cars and 2000 steel underframes.

Apart from the New York subway contracts, which are now not far out of reach, fabricating companies report 240,000 tons of work in sight. In Eastern territory one interest has grown more aggressive, quoting 1.55c. Pittsburgh on eight weeks' delivery, or $1 under the recent market.

One flood effect has been the disappearance of low priced sheets, a number of sheet mills being put out of commission, including some that were making concessions. The largest mills are sold up for about six months.

The steel bar situation grows tighter and Pittsburgh mills are far behind on shipments. An advance would not be difficult, if deliveries could be guaranteed, but the large producers oppose higher prices. Implement makers still have to provide for the bulk of their needs for the year beginning July 1. In the East the bar iron market is easier.

Considerable inquiry for export cast-iron pipe has developed, British works being sold far ahead. Insistence on British specifications is limiting business, however. Canada is likely to be a considerable buyer on this side.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type. Declines in Italics

At date, one week, one month, and one year previous.

	Apr. 16, 1913.	Apr. 9, 1913.	Mar. 19, 1913.	Apr. 17, 1912.
Pig Iron, Per Gross Ton:				
Foundry No. 2 X, Philadelphia	*$17.25*	$17.75	$17.75	$15.00
Foundry No. 2, Valley furnace	*15.50*	16.00	16.50	13.25
Foundry No. 2 S'th'n, Cin'ti...	15.75	15.75	16.25	13.75
Foundry No. 2, Birmingham, Ala.	12.50	12.50	13.00	10.50
Foundry No. 2, furnace, Chicago*	*17.00*	17.25	17.25	14.00
Basic, delivered, eastern Pa....	*16.50*	17.00	17.50	15.00
Basic, Valley furnace	*15.75*	16.00	16.10	13.00
Bessemer, Pittsburgh	17.90	17.90	18.15	15.15
Malleable Bessemer, Chicago*..	17.25	17.25	17.25	14.00
Gray forge, Pittsburgh	*16.15*	16.65	16.90	13.65
Lake Superior charcoal, Chicago	18.00	18.00	18.00	15.75
Billets, etc. Per Gross Ton:				
Bessemer billets, Pittsburgh....	28.50	28.50	28.50	20.00
Open-hearth billets, Pittsburgh.	29.00	29.00	29.00	20.00
Forging billets, Pittsburgh	36.00	36.00	36.00	27.00
Open-hearth billets, Philadelphia	30.00	30.00	32.00	22.40
Wire rods, Pittsburgh	30.00	30.00	30.00	25.00
Old Material, Per Gross Ton:				
Iron rails, Chicago	16.25	16.25	16.25	15.25
Iron rails, Philadelphia.....	18.25	18.25	18.00	15.50
Carwheels, Chicago	16.75	16.75	16.75	13.50
Carwheels, Philadelphia	15.00	15.00	15.00	13.00
Heavy steel scrap, Pittsburgh...	14.25	14.25	14.25	13.00
Heavy steel scrap, Chicago.....	12.50	12.50	12.25	11.50
Heavy steel scrap, Philadelphia	13.50	13.50	13.50	13.25
Finished Iron and Steel,				
Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bessemer rails, heavy, at mill...	1.25	1.25	1.25	1.25
Iron bars, Philadelphia	*1.62½*	1.67½	1.67½	1.27½
Iron bars, Pittsburgh	1.70	1.70	1.70	1.25
Iron bars, Chicago	1.57½	1.57½	1.57½	1.15
Steel bars, Pittsburgh, future..	1.40	1.40	1.40	1.15
Steel bars, Pittsburgh, prompt..	1.85	1.85	1.85	1.15
Steel bars, New York, future..	1.56	1.56	1.56	1.31
Steel bars, New York, prompt..	2.01	2.01	2.01	1.31
Tank plates, Pittsburgh, future.	1.45	1.45	1.45	1.20
Tank plates, Pittsburgh, prompt	1.70	1.70	1.70	1.20
Tank plates, New York, future..	1.61	1.61	1.61	1.31
Tank plates, New York, prompt	1.76	1.76	1.76	1.31
Beams, Pittsburgh, future	1.45	1.45	1.45	1.20
Beams, Pittsburgh, prompt	1.70	1.70	1.70	1.20
Beams, New York, future.....	1.61	1.61	1.61	1.31
Beams, New York, prompt.....	*1.71*	1.76	1.86	1.31
Angles, Pittsburgh, future.....	1.45	1.45	1.45	1.20
Angles, Pittsburgh, prompt....	1.70	1.70	1.70	1.20
Angles, New York, future.....	1.61	1.61	1.61	1.31
Angles, New York, prompt....	*1.71*	1.76	1.86	1.31
Skelp, grooved steel, Pittsburgh	1.45	1.45	1.45	1.12½
Skelp, sheared steel, Pittsburgh	1.50	1.50	1.50	1.17½
Steel hoops, Pittsburgh	1.60	1.60	1.60	1.25

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Pound to Large Buyers:	Apr. 16, 1913. Cents.	Apr. 9, 1913. Cents.	Mar. 19, 1913. Cents.	Apr. 17, 1912. Cents.
Sheets, black, No. 28, Pittsburgh	2.35	2.35	2.35	1.85
Wire nails, Pittsburgh	1.80	1.80	1.75	1.60
Cut nails, f.o.b. Eastern mills	1.80	1.80	1.80	...
Cut nails, Pittsburgh	1.70	1.70	1.70	1.55
Fence wire, ann'l'd, 0 to 9, Pgh.	1.60	1.60	1.55	1.40
Barb wire, galv., Pittsburgh	2.20	2.20	2.15	1.90
Coke, Connellsville, Per Net Ton, at Oven:				
Furnace coke, prompt shipment	**$2.25**	$2.00	$2.40	$2.60
Furnace coke, future delivery	2.25	2.25	2.50	2.25
Foundry coke, prompt shipment	3.00	3.00	3.00	2.75
Foundry coke, future delivery	3.00	3.00	3.00	2.50
Metals, Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	**15.75**	15.62½	15.00	16.00
Electrolytic copper, New York	**15.50**	15.37½	14.87½	16.00
Spelter, St. Louis	*5.60*	5.75	6.15	6.80
Spelter, New York	*5.75*	5.90	6.30	6.95
Lead, St. Louis	4.20	4.20	4.20	4.12½
Lead, New York	**49.50**	48.25	45.87½	43.40
Tin, New York	4.35	4.35	4.35	4.20
Antimony, Hallett, New York	8.50	8.50	8.50	7.75
Tin plate, 100-lb. box, Pittsburgh	$3.60	$3.60	$3.60	$3.30

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11½; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22½c.; Kansas City, 42½c.; Omaha, 42½c.; St. Paul, 32c.; Denver, 84½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.45c. to 1.70c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft., down to the weight of 3-16 in., take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras.	Cents per lb.
Gauges under ¼ in. to and including 3-16 in.	.10
Gauges under 3-16 in. to and including No. 2	.15
Gauges under No. 8 to and including No. 9	.25
Gauges under No. 9 to and including No. 10	.30
Gauges under No. 10 to and including No. 12	.40
Sketches (including straight taper plates) 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths, under 3 ft., to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft., to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.45c. to 1.70c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in. on one or both legs	.10
Angles, 3 in. on one or both legs, less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, hand rail, car-truck and conductor rail)	.05
Angles, channels and tees, under 3 in. wide as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Hand rail tees	.75
Cutting to lengths, under 3 ft., to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft., to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Wire Rods and Wire.—Bessemer, open-hearth and chain rods, $30. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, $1.60; galvanized, $2. Galvanized barb wire, to jobbers, $2.20; painted, $1.80. Wire nails, to jobbers, $1.80.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12 & 12½	13	14	15	16
Annealed	$1.75	$1.80	$1.85	$1.90	$2.00	$2.10	$2.20	$2.30
Galvanized	2.15	2.20	2.25	2.30	2.40	2.50	2.90	3.00

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe (full weight) in effect from April 12, 1913, iron pipe (full weight), from October 21, 1912:

Butt Weld.

Steel. Inches.	Black.	Galv.	Iron. Inches.	Black.	Galv.
⅛, ¼ and ⅜	72½	52	⅛ and ¼	67	48
½	76½	66	⅜	66	47
¾ to 3	79½	71	½	70	57
			¾ to 2½	73	62

Lap Weld.

2	76½	68	1¼	57	46
2½ to 6	78½	70	1½	68	57
7 to 12	75½	65	2	69	59
13 to 15	52½	...	2½ to 4	71	62
			4½ to 6	71	62
			7 to 12	69	56

Plugged and Reamed.

1 to 3, butt	77½	69	1 to 1½, butt	71	60
2, lap	74½	66	2, butt	72	61
2½ to 4, lap	76½	68	1¼, lap	55	44
			1½, lap	66	55
			2, lap	67	57
			2½ to 4, lap	69	60

Butt Weld, extra strong, plain ends.

⅛, ¼ and ⅜	67½	57	⅛	64	53
½	72½	66	¼	68	61
¾ to 1½	76½	70	¾ to 1½	72	63
2 to 3	77½	71	2 and 2½	73	64

Lap Weld, extra strong, plain ends.

2	73½	65	1½	66	60
2½ to 4	75½	67	2	67	59
4½ to 6	74½	66	2½ to 4	71	62
7 to 8	67½	57	4½ to 6	70	61
9 to 12	62½	52	7 and 8	64	54
			9 to 12	59	48

Butt Weld, double extra strong, plain ends.

½	62½	56	½	58	50
¾ to 1½	65½	59	¾ to 1½	61	53
2 to 2½	67½	61	2 to 2½	63	55

Lap Weld, double extra strong, plain ends.

2	63½	57	2	56	50
2½ to 4	65½	59	2½ to 4	61	55
4½ to 6	64½	58	4½ to 6	60	54
7 to 8	57½	47	7 to 8	53	43

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads on lap-welded steel, in effect from February 1, 1913, and standard charcoal-iron boiler tubes, in effect from January 1, 1913, are as follows:

Lap-Welded Steel.		*Standard Charcoal Iron.*	
1¼ and 2 in.	60	1½ in.	44
2¼ in.	57	1¾ and 2 in.	48
2½ and 2¾ in.	63	2¼ in.	44
3 and 3¼ in.	68	2½ to 2¾ in.	53
3½ to 4½ in.	70	3 and 3¼ in.	55
5 and 6 in.	63	3½ to 4½ in.	58
7 to 13 in.	60	Locomotive and steamship special grades bring higher prices.	

2½ in. and mailer, over 18 ft., 10 per cent. net extra.
2¾ in. and larger, over 22 ft., 10 per cent. net extra.
Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft. and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points.

Sheets.—Makers' prices for mill shipments on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets.

	Cents per lb.
Nos. 3 to 8	1.70
Nos. 9 and 10	1.75
Nos. 11 and 12	1.80
Nos. 13 and 14	1.85
Nos. 15 and 16	1.95

Box Annealed Sheets, Cold Rolled.

Nos. 10 and 11	2.00
No. 12	2.00
Nos. 13 and 14	2.05
Nos. 15 and 16	2.10
Nos. 17 to 21	2.15
Nos. 22 and 24	2.20
Nos. 25 and 26	2.25
No. 27	2.30
No. 28	2.35
No. 29	2.40
No. 30	2.50

Galvanized Sheets of Black Sheet Gauge.

	Cents per lb.
Nos. 10 and 11	2.50
No. 12	2.60
Nos. 13 and 14	2.60
Nos. 15 and 16	2.75
Nos. 17 to 21	2.90
Nos. 22 and 24	3.05
Nos. 25 and 26	3.20
No. 27	3.35
No. 28	3.50
No. 29	3.65
No. 30	3.80

Pittsburgh

PITTSBURGH, PA., April 15, 1913.

In those finished steel lines in which business booked would be for second half delivery the manufacturers are hearing more of the tariff than they were 30 days ago, and some manufacturers observe a decrease in both new business and in specifications, which they attribute to conservatism based on the certainty of drastic tariff revision. It appears that those buyers who have tariff uppermost in their minds are considering the effect not so much upon the steel trade and prices in particular as upon business activity in general. This applies particularly to such products as bars, plates and shapes. In products like pipe and wire, in which the business at the moment is for the regular spring trade, nothing is heard of the tariff. In sheets and tin plates, which are regarded as lines most likely to be affected by the contemplated revision, there is no decrease observed in specifications, while prices are notably stronger than 30 days ago. This greater strength may easily be due, and probably is due, to the great loss in output occasioned by the floods. Some of the sheet and tin mills are not yet producing their full normal output, though in nearly all cases the plants have been put in operation in a way. Early in April the mails were exceptionally heavy, due to matter having been delayed by the floods, but in the past week they have become normal, and this makes it possible again to compare specifications with shipments. They are approximately breaking even now, as contrasted with a gain in specifications over shipments in March. New contract business continues light and is probably lighter than the average of the first three months in the year. Under date of Saturday, April 12, the National Tube Company issued a new list on steel pipe, reducing discounts one-half point, and thus effecting an advance of about a dollar a ton in prices of merchant pipe and line pipe. Specifications have been better on these goods since the first of the month, as compared with the corresponding period in March, and it is expected that slight irregularities which were observed in some spots will be eliminated. The independents have concurred in the advance and are publishing new lists.

Pig Iron.—Late last week a Valley consumer purchased 5000 tons of Bessemer iron for early delivery at $17, Valley furnace. A large consumer of malleable iron is in the market for 5000 tons, while another interest is asking prices on 300 tons. Generally speaking, the pig-iron market is very quiet, not showing the resumption of interest after the flood that was expected. Prices have continued to weaken on basic, malleable and foundry iron. There is no difficulty in securing basic iron for convenient deliveries at $15.75, Valley, and malleable can also be secured on the same terms. In foundry iron furnaces have become somewhat aggressive in seeking business, and are openly offering iron for both early delivery and second half down as low as $15.50, Valley. Buyers are showing very little interest as yet, and the general sentiment seems to be that the market will not show a firmer tone until actual bottom is struck by some furnaces reaching their cost level. Considering prices for ore and coke it is respresented that the market has not far to go to reach that basis. We quote standard Bessemer iron at $17; malleable and basic at $15.75 to $16; No. 2 foundry, $15.50 to $15.75; gray forge, $15.25 to $15.50, all f.o.b. cars Valley furnace, with a freight rate of 90c. a ton for delivery in the Pittsburgh district.

Billets and Sheet Bars.—The Republic Iron & Steel Company this week scheduled both Bessemer and open-hearth departments at Youngstown for full operation; they were in operation last week, but not in full. Practically all mills closed by the floods are now in full operation, though they have not speeded up to as heavy outputs as just before the floods. The Carnegie Steel Company has bought 15,000 tons of open-hearth billets from the Alan Wood Iron & Steel Company, for early delivery to the Pencoyd Works, the delivered price being of course considerably lower than the cost of billets if shipped from the Pittsburgh district. For an early delivery billets and sheet bars continue very scarce in this district, and prices are regulated by the ability of consumers to pay, and to put into ordinary finished products consumers cannot afford to pay even present quoted prices, which we continue to name as follows: Bessemer billets, $28.50 to $29; Bessemer sheet bars, $29 to $29.50; open-hearth billets, $29 to $29.50; open-hearth sheet bars, $29.50 to $30, f.o.b. maker's mill, Pittsburgh or Youngstown. Forging billets, $36 to $37, and axle billets, $34 to $35, Pittsburgh.

Ferroalloys.—The ferromanganese market continues extremely quiet, the tone being entirely unsettled by the recent cut of $4 a ton made by the English makers, the first reduction since the market started definitely upward late in 1911. It is possible that some dealers would shade the new price, as they did so freely when the official price was $65. We quote English ferromanganese for prompt or forward delivery at $61, Baltimore, the new freight to Pittsburgh being $2. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at $75; over 100 tons to 600 tons, $74; over 600 tons, $73, Pittsburgh. We quote 10 per cent. at $24; 11 per cent., $25; 12 per cent., $26, f.o.b. cars at furnace, Jackson, Ohio or Ashland, Ky. We quote ferrotitanium at 8c. per pound in carloads; 10c. in 2000-lb. lots and over; 12½c. in lots up to 2000 lb.

Wire Rods.—Regular consumers are all covered to July 1 at least, and are specifying fairly well on contracts, while new business is correspondingly quiet. We quote Bessemer, open-hearth and chain rods at $30, Pittsburgh.

Muck Bar.—The local muck bar market continues quiet, but prices are held firm as there is no surplus material to be had, and we quote $32, Pittsburgh, for prime all pig muck. Some Eastern mills are offering material at lower figures for Pittsburgh delivery, but this is understood to be made largely from scrap.

Skelp.—Skelp mills are not eagerly seeking new business, being fairly well filled to June, and the market remains as last quoted: Grooved steel skelp, 1.45c. to 1.50c.; sheared steel skelp, 1.50c. to 1.55c.; grooved iron skelp, 1.75c. to 1.80c.; sheared iron skelp, 1.85c. to 1.90c., delivered at buyers' mills in the Pittsburgh district. The advance of $1 a ton in steel pipe a few days ago is not expected to have any appreciable effect on the skelp market.

Steel Rails.—Railroads continue to specify freely against their contracts for standard rails, on account of the great amount of repairs necessitated by the recent floods. No new orders of importance have been booked. Demand for light rails is fairly active. We quote splice bars at 1.50c. per lb. and standard section rails at 1.25c. per lb. Light rails are quoted as follows: 25, 30, 35, 40 and 45 lb. sections, 1.25c.; 16 and 20 lb., 1.30c.; 12 and 14 lb., 1.35c., and 8 and 10 lb., 1.40c., all in carload lots f.o.b. Pittsburgh.

Structural Material.—The American Bridge Company has booked an order for five barges for the Direct Navigation Company, New Orleans, involving about 800 tons of steel, and 800 tons of bridge material from the Queen & Crescent. The Riter-Conley Mfg. Company has booked 1400 tons of bridge material for the Pennsylvania Lines West and 1000 tons for the Dock Street pier in Philadelphia. This company has just shipped 115 transmission towers of galvanized steel to a Pearson interest at Sao Paulo, Brazil. The Boggs & Buhl Company of this city will build an addition to its store, requiring 700 tons of structural material, while the Gwynne Building, Cincinnati, 12 stories, calling for about 1800 tons, is about ready for bids. We quote beams and channels up to 15 in. at 1.45c. to 1.50c. for delivery at convenience of the mill, which would be second half of this year, while small lots from warehouse for prompt delivery are bringing from 1.60c. up to 2c., depending on the size of the order and the deliveries wanted.

Iron and Steel Bars.—The few contracts recently placed by agricultural implement makers for their new season's requirements in steel bars do not seem to have precipitated any general buying movement in this direction, the implement interests showing less keenness than was expected, probably on account of the tariff. Specifications for steel bars are heavy, but hardly exceed shipments as they did in March. Specifications on iron bar contracts are fairly good, but there is not much new buying. We quote merchant steel bars at 1.40c. to 1.45c. for delivery at convenience of the mill, which would not be before third quarter, while for shipment from warehouses 1.90c. to 2c. is quoted. We quote iron bars at 1.70c. to 1.75c. for reasonably prompt delivery.

mills charge $1 extra per ton for twisting ¾-in. and larger steel bars and $2 extra for ½ to ⅝ in.

Sheets.—The American Sheet & Tin Plate Company is this week operating from 73 to 75 per cent. of its sheet mills, making a gain of a few per cent. over last week. Several of its mills are still down from lack of steel. The independent mills generally are in operation again, the Parkersburg Iron & Steel Company, located where the water was exceptionally high, having scheduled a start for this week. Specifications on contracts are very good, while new contracts are not heavy. On account of the loss in production caused by the floods, and through two new mills having booked enough tonnage to enable them to start, the sheet market has become quite firm at the regular prices, and it is not altogether easy to place orders at these figures for early delivery. The leading interest's obligations would engage it fully into next November. We quote 1.75c. for No. 10 blue annealed; 2.35c. for No. 28 Bessemer black sheets; 3.50c. for No. 28 galvanized, and 2.30c. for No. 28 tin mill black plate. These prices are f.o.b. Pittsburgh, in carload and larger lots, jobbers charging the usual advances for small lots from store.

Plates.—The Boston Elevated has ordered 25 passenger cars from the American Car & Foundry Company and 30 from the Pressed Steel Car Company, while the first named company has taken 200 box cars from the Chicago, Peoria & St. Louis. The Haskell & Barker Car Company has booked 300 ballast cars from the Chicago & Western Indiana. The Wabash is securing court authority for the purchase of 2000 underframes and about 1000 completed cars of various designs, inquiries against which will soon be formally in the market. Deliveries on plates continue to loosen up, so that less business is being placed at premiums. We quote ¼-in. and heavier tank plate at 1.45c., Pittsburgh, for forward delivery, fair sized lots for delivery in three or four weeks at 1.60c. to 1.65c., and small lots for prompt delivery up to 2c., Pittsburgh.

Tin Plate.—Demand for tin plate upon contracts is very heavy and is crowding the mills on account of so much production having been lost by the floods. While the mills are nominally in almost full operation again they are not getting out full tonnages of fresh material, as a great deal of material had to be reconditioned on account of damage by water. The American Sheet & Tin Plate Company is operating 87 per cent. of its tin mills this week, the same as last week, substantially as large a number as at any time this year, and considerably better than the average for a few weeks before the floods. Prices are very firmly maintained. We quote 100-lb. cokes at $3.60; 100-lb. ternes at $3.45, and No. 28 black plate at $2.30, all f.o.b. Pittsburgh.

Hoops and Bands.—Additional contracts for third quarter's delivery of hoops and bands have been closed and the regular consumer trade is now well rounded up. We continue to quote hoops at 1.60c. to 1.65c. and bands at 1.40c. to 1.45c., extras on the latter as per the steel bar card, these prices being named on delivery at mills' convenience, while for prompt shipment premiums are being paid.

Bolts and Rivets.—There is very little new buying, consumers being well covered by old contracts for second quarter and in many cases running into third quarter. Premiums for prompt shipment no longer obtain, and there is some shading of regular prices, which we continue to quote at $2.20 for button-head structural rivets and $2.30 for cone-head boiler rivets. The discounts on bolts are as follows, in lots of 300 lb. or over, delivered within a 20c. freight radius of maker's works:

Coach and lag screws	80 and 10% off
Small carriage bolts, cut threads	75 and 5% off
Small carriage bolts, rolled threads	75 and 10% off
Large carriage bolts	70% off
Small machine bolts, cut threads	75 and 10% off
Small machine bolts, rolled threads	75, 10 and 5% off
Large machine bolts	70 and 7½% off
Machine bolts with C.P.C. and T nuts, small	75 and 5% off
Machine bolts with C.P.C. and T nuts, large	70% off
Square hot pressed nuts, blanked and tapped	$5.70 off list
Hexagon nuts	$6.30 off list
C.P.C. and R. square nuts, tapped and blank	$5.70 off list
Hexagon nuts, ⅝ and larger	$6.60 off list
Hexagon nuts smaller than ⅝	$7.20 off list
C.P. plain square nuts	$5.20 off list
C.P. plain hexagon nuts	$5.50 off list
Semi-finished hexagon nuts ⅝ and larger	85% off
Semi-finished hex. nuts smaller than ⅝	85 and 10% off
Rivets, 7/16 x 6½, smaller and shorter	75, 10 and 10% off
Rivets, metallic tinned, bulk	3½c. per lb. net extra
Rivets, tin plated, bulk	1½c. per lb. net extra
Rivets, metallic tinned, packages	70, 10 and 10% off

Wire Products.—Specifications on wire contracts have improved, partly on account of heavy demand expected in some of the flood districts and partly, perhaps because some of the mills have been threatening cancellation of old contracts if specifications are not filed promptly. While not especially active, the wire trade is in better condition than for many weeks. We quote makers' prices to jobbers as follows: Wire nails, $1.80 base, per keg; cut nails, $1.70 to $1.75; galvanized barb wire, $2.20 per 100 lb.; painted, $1.80; annealed fence wire, $1.60, and galvanized fence wire, $2, f.o.b. Pittsburgh, usual terms, freight added to point of delivery. Jobbers charge the usual advances over these prices for small lots from store.

Railroad Spikes.—Specifications are heavy against contracts, stimulated no doubt by the extra work the railroads will have to do after the temporary work done immediately after the floods, and there are better specifications from jobbers as well. We quote railroad spikes in base sizes, 5½ x 9/16 in., on large contracts with the railroads, at $1.80, while for carload lots $1.90 is charged; small railroad and boat spikes, $1.90 to $2 per 100 lb., f.o.b. Pittsburgh, for forward delivery.

Shafting.—Producers of shafting are comfortably filled with business, specifications coming in freely, while some contract business is already being closed with agricultural implement makers for their new season. We quote cold-rolled shafting at 58 per cent. off in carload lots, and 53 per cent. in small lots delivered in base territory, the usual slight differential over these discounts being allowed to the very largest consumers.

Merchant Steel.—The market shows no important developments, and producers are in comfortable position as to tonnage on books. Prices are firm and we quote: Iron finished tire, 1½ x ½ in. and larger, 1.40c. to 1.55c., base; under 1½ x ½ in., 1.55c. to 1.65c.; planished tire, 1.60c. to 1.70c.; channel tire, ¾ to ⅞ and 1 in., 1.90c. to 2c.; 1⅛ in. and larger, 1.80c. to 1.90c.; toe calk, 2c. to 2.10c., base; flat sleigh shoe, 1.50c. to 1.65c.; concave and convex, 1.80c. to 1.90c.; cutter shoe, tapered or bent, 2.30c. to 2.40c.; spring steel, 2c. to 2.10c.; machinery steel, smooth finish, 1.80c. to 1.85c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and 1½ in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.30c.; soft, 3.55c.; coils, hard, 3.20c.; soft, 3.45c.; freight allowed. The usual differentials apply for lighter gauges and sizes.

Iron and Steel Scrap.—The scrap market has not reflected the increased softness in pig iron, and prices are regarded as fairly well held in the circumstances. There are occasional sales of well selected heavy melting steel at $14.50, delivered, but odd lots can generally be picked up at $14.25. Railroad material is believed to be going direct to consumers at higher prices than these. Last week's report contained a typographical error by which quotations on cast borings and wrought turnings were interchanged. We reduce quotations by 50c. on grate bars, No. 1 railroad wrought and axle turnings, and advance quotations slightly on No. 2 foundry cast, axles and stove plate. Quotations are as follows, per gross ton:

Heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen and Pittsburgh delivery	$14.25 to $14.50
No. 1 foundry cast	14.25 to 14.50
No. 2 foundry cast	13.50 to 13.75
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	10.50 to 10.75
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	16.25 to 16.50
No. 1 railroad malleable stock	13.50 to 13.75
Grate bars	10.25 to 10.50
Low phosphorus melting stock	16.50 to 16.75
Iron car axles	26.50 to 27.00
Steel car axles	18.00 to 18.25
Locomotive axles, steel	23.50 to 24.00
Locomotive axles, iron	27.00 to 27.25
No. 1 busheling scrap	13.25 to 13.50
No. 2 busheling scrap	9.50 to 9.75
Old carwheels	15.75 to 16.00
*Machine shop turnings	8.50 to 8.75
*Cast-iron borings	10.25 to 10.50
†Sheet bar crop ends	16.00 to 16.25
Old iron rails	16.25 to 16.50
No. 1 railroad wrought scrap	15.50 to 15.75
Heavy steel axle turnings	11.50 to 11.75
Stove plate	10.50 to 11.00

*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.
†Shipping point.

Merchant Pipe.—The Philadelphia Company has placed the steel pipe mentioned last week as inquired for—30 miles of 16-in. and 15 miles of 12-in.—while it has also contracted for about 2000 tons of iron pipe, involving about 35 miles of 3 to 8-in. Under date of April 12, as noted, the National Tube Company issued a new card on steel pipe, reducing discounts by one-half point, thus advancing quotations about $1 a ton on regular steel pipe and line pipe, oil country goods not being affected. Other manufacturers are concurring

by publishing new lists. The advance is predicted upon heavier specifications for merchant pipe, the mills now being in comfortable position on all descriptions of tubular goods. There is no indication that any change will be made in iron pipe prices, consequent upon the advance in steel pipe.

Boiler Tubes.—Demand for boiler tubes has been extremely heavy and all producers are well booked up. Discounts are reported as being firmly held.

Coke.—The coke movement this week has gotten back almost to normal, as the railroads are able to handle shipments with facility and the furnaces which were banked on account of floods are practically all in operation again. The coke market has reflected less disturbance from the interruption to shipments than would have been expected, and it is reported somewhat firmer this week than last. Small lots of prompt furnace coke are sometimes picked up at $2.15 or $2.20, but on a fair sized lot it is claimed that $2.25 could not be shaded, for standard coke. There is practically no interest in contract coke, but the market is quotable nominally at $2.25 to $2.50. Standard grades of 72-hr. foundry coke are quotable at $3 to $3.50 for both prompt and contract. The Connellsville Courier gives the total output of the Upper and Lower Connellsville regions last week as 373,634 tons, an increase over the previous week of 19,701 tons.

Chicago

CHICAGO, ILL., April 16, 1913.—(*By Telegraph.*)

Pig Iron.—The only claim to strength which this market can offer is one that has its foundation in the fairly obvious requirements of the last half. Inquiry concerning the price of iron for that delivery is not lacking, but the buying attitude is still one of skepticism regarding bottom quotations. A number of inquiries for tonnages up to 1500 are noted. For Southern iron $13, Birmingham, is the open quotation for the third quarter at least. Buyers report offers of $12.50 and less, but thus far this seems to be trading talk and cannot be substantiated by sales for prompt shipment. For the remainder of the second quarter, prices have no definite level and depend upon the melter's bargaining ability. The Lake furnaces appear to have weakened somewhat as well, and $17.25 f.o.b furnace is no longer the lowest that can be done for prompt shipment. The general disposition of consumers is indicated by the frank avowal of one large buyer to delay contracting indefinitely, meeting his needs meanwhile with specific purchases in small tonnages as required. The local malleable foundry whose inquiry for 5000 tons has been noted bought only a small portion of this quantity. A sale of 4000 tons of Northern iron on a Southern competitive basis is reported. The resumption of coke shipments which promised relief to the local stacks now appears less permanent than was anticipated. Indications are that the real effects of oven and transportation conditions are still to be felt. The present outlook promises but a slight chance for operating all of the furnaces continuously. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 1, 2, 3, 4	$18.00 to $18.75
Northern coke foundry, No. 1	17.50 to 18.00
Northern coke foundry, No. 2	17.00 to 17.50
Northern coke foundry, No. 3	16.50 to 17.00
Southern coke, No. 1 foundry and No. 1 soft	17.35 to 17.85
Southern coke, No. 2 foundry and No. 2 soft	16.85 to 17.35
Southern coke, No. 3	16.35 to 16.85
Southern coke, No. 4	15.85 to 16.35
Southern gray forge	15.85 to 16.35
Southern mottled	15.85
Malleable Bessemer	17.25 to 17.50
Standard Bessemer	19.40 to 19.90
Basic	17.25 to 17.50
Jackson Co. and Kentucky silvery, 6 per cent	20.40
Jackson Co. and Kentucky silvery, 8 per cent	21.40
Jackson Co. and Kentucky silvery, 10 per cent	22.40

(By Mail)

As viewed from the standpoint of this market's activities, new business in finished steel lines continues to develop in ample volume to maintain a thoroughly sound condition. Mill schedules for the full last half are now provided for very generally. Consumers are not less clamorous for the material they have ordered than at any previous time. There appears to be an even greater prevalence of a need for steel at once and the warehouses are filling such orders in increasing numbers. Even more significant, as affecting Chicago jobbers, are the widening limits of territory from which demand is being made upon local stocks, shipments to the Atlantic coast emphasizing this situation. The above is particularly applicable to steel bars for all purposes. The most important single tonnage of the week was involved in the order for 3000 cars placed by the Grand Trunk. The pig-iron situation continues in striking contrast to conditions with regard to steel. Delay in buying has long since passed the reasonable expectancy and still the disposition to contract ahead is almost entirely lacking despite a nearly normal interest in prices. Some new influences may be injected by reason of the coke shortage, which is again threatening furnace operation at Chicago with added seriousness. The old material market parallels that of pig iron and prices are again lower, following a brief show of strength, due apparently to artificial processes of resuscitation.

Rails and Track Supplies.—The repair of road beds through Ohio and Indiana has brought into this market some orders for track fastenings and rails in carload lots for rush shipment, but the total tonnage has not had any significance as yet. With the exception of one or two moderate lots of rails, negotiations for which are pending, no transactions of interest are noted. We quote standard railroad spikes at 1.90c. to 2c., base; track bolts with square nuts, 2.30c. to 2.40c., base, all in carload lots, Chicago; tie plates, $33 to $35 net ton; standard section Bessemer rails, Chicago, 1.25c., base; open-hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 150c., Chicago.

Structural Material.—The placing of its order for 3000 cars by the Grand Trunk brings into the market another important tonnage of car structural shapes. In addition the Chicago & Western Indiana has ordered 300 ballast cars from the Haskell & Barker Car Company, the Norfolk Southern has specified 330 box cars with the Mt. Vernon Car & Mfg. Company and 160 flat cars with the American Car & Foundry Company, while the Wabash is obtaining court sanction on requisitions for 200 hopper cars, 750 automobile cars and 2000 steel underframes. Contracts for fabricated steel placed during the week aggregated about 5000 tons. The American Bridge Company took orders for 244 tons for a Great Northern blacksmith shop at St. Paul, 262 tons for the Anaconda Copper Mining Company at Great Falls, Mont., and 170 tons for the Missouri, Kansas & Texas. The Chicago, Burlington & Quincy also placed an order for 108 tons for lift bridge towers and the International Harvester Company is taking 299 tons of steel for its new forge shop at Plano, Ill. There are no new developments in the structural mill situation and prices are unchanged. We quote for mill shipment, Chicago delivery, 1.63c. to 1.68c.

The movement of structural shapes from store presents no special features, but constitutes an important part of the general activity. We quote shapes from store, 2.05c.

Plates.—The further buying of locomotives includes 25 for the Grand Trunk to be built by the Baldwin Locomotive Works and 30 to be purchased by the Wabash. Less is heard of premium business on plates. Contract deliveries are meeting the needs of most of the larger users and a large number of tank and boiler shops are quoting only on the basis of material out of store. For mill shipment, Chicago delivery, we continue to quote 1.63c. to 1.68c.

The handling of plates in long lengths and standard widths, from which specifications for plates cut to length are filled, has proved a real convenience to the trade and has been a contributing influence in the very heavy sales from store. Warehouse quotations are unchanged and we quote 2.05c.

Sheets.—These are among the most active of the finished steel products. In blue annealed and galvanized the new business offering is considerably in excess of the tonnage the local mills are prepared to book. Prices for galvanized sheets continue irregular notwithstanding, a weakness attributable in part to the marked decline in the price of spelter and in part to the necessities of some of the mills not in a position to take business very far into the future. We quote for Chicago delivery in carloads from mill: No. 28 black sheets, 2.53c.; No. 28 galvanized, 3.68c.; No. 10 blue annealed, 1.93c.

Out of store prices continue without change as follows: No. 10 blue annealed, 2.25c.; No. 28 black, 2.90c.; No. 28 galvanized, 4.15c.

Bars.—The activity in the buying of steel bars for a wide variety of manufacturing purposes, for reinforced concrete construction and for the replenishing of jobbers' stocks is unusual. Current orders are for the most part of a miscellaneous character as distinguished from contract business. Bar sales by one mill during the week approximated 20,000 tons. A few implement man-

facturers made contracts, the largest among those noted being for 3000 tons. Bar iron is not so prominent a factor, but the average delivery from mills in this district is still about six weeks. We quote for mill shipment as follows: Bar iron, 1.57½c. to 1.62½c.; soft steel bars, 1.58c. to 1.65c.; hard steel bars, 1.60c. to 1.70c.; shafting in carloads, 58 per cent. off; less than carloads, 53 per cent. off.

Warehouse shipments of bars parallel in activity the movement from mill. The size and diversity of stocks carried by local jobbers have resulted in a steadily increasing radius of distribution which extends into territories distinctly tributary under ordinary circumstances to other distributing centers. For delivery from store, we quote soft steel bars, 1.95c.; bar iron, 1.95c.; reinforcing bars, 1.95c. base with 5c. extra for twisting in sizes ¾ in. and over, and 7½c. extra for smaller sizes; shafting 51 per cent. off.

Wire Products.—Among the various mill products for which it was anticipated a demand would be created by the flood conditions of Ohio, Indiana and Illinois wire products alone have shown a noteworthy increase in shipments. The replacement of stocks in hardware stores and warehouses and the repairing of damages have resulted in a large aggregate shipment of wire nails, wire fencing and barb wire. We quote as follows to jobbers: Plain wire, No. 9 and coarser, base, $1.78; wire nails, $1.98; painted barb wire, $1.98; galvanized, $2.38; polished staples, $1.98; galvanized, $2.33, all Chicago.

Cast-Iron Pipe.—The past week brought out no awards for cast-iron pipe of any importance. The unusual dearth of orders for pipe in the larger sizes is an especially unsatisfactory phase of the situation, and on these sizes prices are correspondingly weak. We quote as follows per net ton, Chicago: Water pipe, 4 in., $30.50; 6 to 12 in., $28.50; 16 in. and up, $27.50, with $1 extra for gas pipe.

Old Material.—An attempt to establish higher values for scrap in this market, that was for the time being successful, has been succeeded by a reaction which seems to make more apparent the real heaviness of the market. Prices are lower than when last quoted, and liberal tonnages of the common grades are being offered without a very ready absorption by the melters. The Santa Fé, which a fortnight ago disposed of several thousand tons of scrap of various grades, is again offering round tonnages at inside market prices. Other railroad offerings include about 5300 tons by the Northern Pacific, of which 2000 tons is steel rails and 1400 tons iron rails. Iron rails are rapidly disappearing, and the tonnage on this list is interesting as one of the few remaining accumulations. The Soo Line is offering about 250 tons and the St. Louis & San Francisco 150 tons. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton.

Old iron rails	$16.25 to $16.75
Old steel rails, rerolling	14.50 to 15.00
Old steel rails, less than 3 ft	14.00 to 14.50
Relaying rails, standard section, subject to inspection	24.00
Old carwheels	16.75 to 17.25
Heavy melting steel scrap	12.50 to 13.00
Frogs, switches and guards, cut apart	12.50 to 13.00
Shoveling steel	12.50 to 12.75
Steel axle turnings	10.50 to 11.00

Per Net Ton.

Iron angles and splice bars	$15.75 to $16.25
Iron arch bars and transoms	16.00 to 16.50
Steel angle bars	12.00 to 12.50
Iron car axles	21.25 to 21.75
Steel car axles	18.75 to 19.00
No. 1 railroad wrought	12.25 to 12.75
No. 2 railroad wrought	11.50 to 12.00
Cut forge	11.50 to 12.00
Steel knuckles and couplers	12.00 to 12.50
Steel springs	12.50 to 13.00
Locomotive tires, smooth	13.25 to 13.75
Machine shop turnings	7.50 to 8.00
Cast and mixed borings	6.75 to 7.25
No. 1 busheling	10.75 to 11.25
No. 2 busheling	7.75 to 8.25
No. 1 boilers, cut to sheets and rings	8.75 to 9.25
Boiler punchings	12.50 to 13.00
No. 1 cast scrap	12.50 to 13.00
Stove plate and light cast scrap	10.50 to 11.00
Railroad malleable	13.25 to 13.75
Agricultural malleable	11.50 to 12.00
Pipes and flues	9.25 to 9.75

Rivets and Bolts.—The published quotations for rivets on the basis of 2.20c., Pittsburgh, are more distinctly nominal than at any time and concessions are more pronounced. Bolt prices have been exceptionally free from irregularities, the well filled order books of the mills supporting the market despite the absence of important buying. We quote from mill as follows: Carriage bolts up to ¾ x 6 in., rolled thread, 75-10; cut thread, 75-5; larger sizes, 70-2½; machine bolts up to ⅜ x 4 in., rolled thread, 70-10-5; cut thread, 75-10; large size, 70-7½; coach screws 80-10 hot pressed nuts, square head, $5.70 off per cwt.; hexagon, $6.30 off per cwt. Structural rivets, ¾ to 1¼ in., 2.38c., base, Chicago, in carload lots; boiler rivets, 0.10c. additional.

Out of store we quote for structural rivets, 2.70c., and for boiler rivets, 2.90c. Machine bolts up to ⅜ x 4 in., 70-7½; larger sizes, 65-5, carriage bolts up to ⅜ x 6 in., 70-5; larger sizes, 65 off. Hot pressed nuts, square head, $5.30, and hexagon, $5.90 off per cwt.

Philadelphia

PHILADELPHIA, PA., April 15, 1913.

Heavy basic iron buying has been the feature of the market, a leading consumer taking upward of 40,000 tons for delivery up to September 1 at $16.50 delivered, a decline of 50c. compared with recent sales. The foundry iron market has developed considerable weakness. Prices are irregular, with declines ranging from 25c. to 50c. Orders for plates and shapes are making slight gains. Prices are unchanged, but premiums are easier. Open-hearth billets have been in good inquiry. Iron bars are in moderate demand, but prices are easier. Coke has been quiet. Very little movement has developed in old material and in some grades prices have sagged. The trade, while interested in the proposed new tariff, is not inclined to protest, feeling that notwithstanding any protest the bill will be passed in substantially its present form. It is the feeling that little effect will be noted by lowered duties this year, but if the demand decreases sharp readjustments will be necessary to meet the new conditions.

Iron Ore.—The proposed transfer of iron ore to the free list is not expected to have any material effect on importations, the present duty being considered merely nominal. The movement in iron ore has been unimportant; negotiations are pending, but close slowly. The season's shipments of Newfoundland ore are about to begin, vessels now loading for delivery at this port. Importations during the week were confined to Swedish ore, of which 30,953 tons came in.

Pig Iron.—In the past week open concessions have been made in practically all grades. The most important transaction has been in basic iron. The leading buyer of this grade in the East has practically closed for 35,000 to 40,000 tons, for shipment ranging up to September 1, at $16.50 delivered. While sellers have not received definite contracts, it is understood that the business will be divided between five or six Eastern furnaces. The price at which this business was taken represents a decline of 50c. a ton against a recent purchase. Low phosphorus pig, which recently declined to $23.50 delivered here for standard analysis iron, has been sold in further lots at the same price, one Eastern steel casting plant taking 2000 tons. Foundry grades are on a lower price level. Producers are now openly quoting $17.50 delivered here for moderate lots of standard eastern Pennsylvania No. 2 foundry and moderate sales have been made at that basis. In instances sellers obtain $17.75 delivered, but at the same time $17.25 can easily be done for some very good brands, while reports are current that this price has, in sharp competition, also been shaded. Consumers are not showing any haste to place orders, while on the other hand producers are aggressively going after every inquiry that comes out. Current sales of the higher grades of foundry iron have been confined to small lots for early delivery, in the aggregate representing a good total. Cast-iron pipe makers, while not closing for any heavy tonnages, are still in the market for low grade iron. An Eastern soil pipe maker has been an active inquirer and has made some purchases at reported low prices. Virginia foundry grades have settled to a $15 furnace basis for No. 2 X and $14.75 for No. 2 plain. Producers have been selling more freely on this basis, while a small amount of resale iron is believed to be still available at slight concessions. There has been a better movement in rolling mill forge iron in this district; one Schuylkill Valley consumer is reported to have purchased 2000 tons, but details as to price are not disclosed. Concessions from recent quotations are, however, available. Statistics compiled by the Eastern Pig Iron Association show stocks slightly higher than a month ago. Total stocks, however, are still far below normal. Prices show continued irregularity, quotations depending largely on the tonnage asked for and on the buyer. The following range about represents the market for standard brands delivered in buyers' yards in this vicinity:

Eastern Pennsylvania No. 2 X foundry	$17.25 to $17.75
Eastern Pennsylvania No. 2 plain	17.00 to 17.25
Virginia, No. 2 X foundry	17.80 to 18.00
Virginia, No. 2 plain	17.55 to 17.75
Gray forge	16.50 to 16.75
Basic	16.50
Standard low phosphorus	23.50

Ferroalloys.—The reduction in the price of 80 per cent. ferromanganese appears to have resulted in less rather than increased inquiry. The proposed advance in the duty under the new tariff bill has also had an effect on retarding business. Quotations for ferromanganese are nominally $61, seaboard, with only small sales reported. Importations of ferromanganese at this port last week aggregated 906 tons. Very little business is moving in furnace ferrosilicon. Western producers were compelled to close down on account of the recent floods. A small lot of resale 11 per cent. grade was sold at $29.30 delivered in this vicinity.

Billets.—Quite a good volume of inquiry for both rolling and forging steel is coming to Eastern mills, which are entering a satisfactory amount of new business—usually in small lots—and are comparatively well sold up. The range of prices for basic open-hearth rolling billets is somewhat narrower. For reasonably early shipment $31 delivered has been done, but for extended shipment $30 is quoted. Forging steel is in good demand and prices are strong at $36, minimum, Eastern mill, for ordinary specifications.

Plates.—Eastern mills are again receiving a better volume of business, and unfilled orders for reasonably early delivery are accumulating. Under the circumstances they are holding quite firmly to 1.75c. delivered here as a minimum, although Western mills, making uncertain deliveries, continue to quote 1.60c. to 1.65c. delivered here. Considerable new business is coming from bridge, car and locomotive builders. Further moderate orders for export to Canada are being taken, usually at top prices. Makers of plates take an optimistic view of the situation and look for a continued active demand.

Structural Material.—The contract for the building for the Tin Decorating Company, Baltimore, Md., has been awarded to Irwin & Leighton, who state that the contract for the structural steel work, 2000 tons, will be placed in a few days. New bids are going in on the proposed Finance Building on South Penn square. Bids are in on 1000 tons for an addition to the Beach street power house for the Philadelphia Rapid Transit Company. The Philadelphia & Reading Railway will require 1000 tons for shops at St. Clair, Pa. Considerable moderate bridge work is also before the trade. The general demand for miscellaneous plain shapes is better, particularly for the larger sizes, although some Eastern mills could take care of more business. On small shapes mills are crowded with orders and are still much behind in deliveries. Prices show considerable range. Eastern mills quote from 1.65c. delivered to 1.75c. at mill for plain shapes, dependent on specification and delivery. Western makers still quote 1.60c delivered, but cannot promise early shipments.

Sheets.—The demand is again more active. Numerous inquiries for good quantities for early as well as extended delivery are before the trade, but there is little inclination to sell far ahead. Eastern mills now have a very satisfactory volume of business on order books. Prices are being well maintained. Western No 10 gauge blue annealed sheets are quoted at 1.90c. delivered here, while Eastern mills, making smooth, loose-rolled sheets, obtain 2c. for reasonably early shipment.

Bars.—Less business is moving in iron bars and makers are seeking business more aggressively, which has resulted in easier prices being quoted by some mills. While certain makers still adhere to 1.60c. at mill, equal to 1.67½c. here, business has been done at 1.55c., mill, or 1.62½c. here, and there are prospects of even lower quotations available on desirable specifications. Steel bars have been in good demand and prices are maintained at 1.55c. to 1.60c. for contract bars. Prompt steel bars still command a premium.

Coke.—The market has been quiet. Little contract coke is being offered, and the bulk of the sales have been in prompt lots. Furnace coke is nominally quoted at $2 to $2.25 at oven, while foundry coke is available at prices ranging from $2.75 to $3.50, according to grade. The following range of quotations, per net ton, about represents the market for deliveries in buyers' yards in this vicinity:

Connellsville furnace coke	$4.25 to $4.75
Connellsville foundry coke	4.90 to 5.65
Mountain furnace coke	4.15 to 4.65
Mountain foundry coke	4.60 to 5.40

Old Material.—Consumers are pretty well supplied, while sellers are not forcing the market. In some grades small sales have been made at lower prices. Heavy melting steel has been inactive. Rolling mill grades are weak. A round lot of low phosphorus steel scrap for extended shipment was sold at $17.25, delivered. Both buyers and sellers appear to be marking time, awaiting developments. Quotations, while to a certain extent nominal, range about as follows, for delivery in buyers' yards in this district, covering eastern Pennsylvania and nearby points, taking a freight rate varying from 35c. to $1.35 per gross ton:

No. 1 heavy melting steel	$13.50 to $14.00
Old steel rails, rerolling (nominal)	15.50 to 16.00
Low phosphorus heavy melting steel scrap	17.25 to 17.75
Old steel axles (nominal)	19.00 to 20.00
Old iron axles (nominal)	27.00 to 28.00
Old iron rails	18.25 to 18.75
Old carwheels	15.00 to 15.25
No. 1 railroad wrought	15.50 to 16.00
Wrought-iron pipe	12.75 to 13.25
No. 1 forge fire	12.00 to 12.50
No. 2 light iron (nominal)	7.00 to 7.50
No. 2 cut busheling	9.50 to 10.00
Wrought turnings	10.00 to 10.50
Cast borings	10.00 to 10.50
Machinery cast	14.00 to 14.50
Grate bars, railroad	10.50 to 11.00
Stove plate	10.50 to 11.00
Railroad malleable (nominal)	13.00 to 13.50

Cleveland

CLEVELAND, OHIO, April 15, 1913.

Iron Ore.—Rail shipments to Escanaba have been started but it will be several days before the first ore cargoes leave that port. The straits of Mackinac are still filled with ice, and it is probable that the first ore boat will not get started before April 20. Owing to ice conditions in Lake Superior it is uncertain when shipments will begin from the head of the Lakes. There is considerable demand from furnacemen for early cargoes of ore and it is expected that the movement will be heavy from the start. While dock shipments to the Valley and Pittsburgh districts are about normal, an embargo is still in force on ore from Jackson and the Ironton district, no ore having been sent to these points since the railroad traffic was demoralized by the recent floods. Recently one Cleveland ore firm, acting independently, carried to the Interstate Commerce Commission its opposition to the imposition of 5c. per ton dock charges on ore shipped to Escanaba, Ashland and Marquette. Other ore firms have now decided to join in fighting this dock charge. We quote as follows: Old Range Bessemer, $4.40; Mesaba Bessemer, $4.15; Old Range, non-Bessemer, $3.60; Mesaba non-Bessemer, $3.40.

Pig Iron.—The market is very dull and prices on foundry grades are weaker, quotations for the last half having further declined 50c. a ton to $15.50, Valley furnace, for No. 2. This price was being made a week ago but only for prompt shipment iron. A few last-half sales are reported at $15.50 and $15.75. With the cost of production increased about $1 a ton because of the advance of ore prices, pig-iron prices have gotten down to where the margin of profit for the furnacemen is quite small. Buyers generally are taking no interest in the last half, and no activity for such delivery is expected until buyers are satisfied that the bottom has been reached. Owing to the setback caused by the recent floods and the further reduction in output by reason of the unsatisfactory operation of several furnaces after being banked a number of days, many consumers are having trouble in getting iron as needed and there is considerable demand for small lots for prompt shipment. In spite of the general weakness, the consumption continues heavy. Corrigan, McKinney & Co. plan to start up their second Cleveland furnace to-morrow. This was blown out after the floods necessitated banking. There is no change in the Southern situation, there is practically no inquiry, and No. 2 is being quoted at $12.50, Birmingham, for second quarter. For prompt shipment and for the second quarter we quote, delivered Cleveland, as follows:

Bessemer	$17.90 to $18.00
Basic	16.75 to 16.90
Northern No. 2 foundry	16.25
Southern No. 2 foundry	16.85
Gray forge	15.75
Jackson County silvery, 8 per cent. silicon	20.55 to 21.55

Coke.—There is practically no demand for furnace or foundry grades. Few foundries have as yet bought for last-half requirements. We quote standard Connellsville furnace coke at $2.25 per net ton at oven for prompt shipment and $2.25 to $2.50 for contract. Standard 72-hr. foundry coke is held at $3 to $3.50 for spot shipment and $3 to $3.25 for the last half.

Finished Iron and Steel.—Specifications are good and there is considerable inquiry for contracts but the volume of current orders is not so heavy as a few weeks ago. Warehouse business, however, continues large and jobbers' stocks are badly depleted, the supply of many sizes being exhausted. Implement manufactur-

ers in this territory were quite active during the week in placing contracts for their steel bar requirements for the last half. None of the trade in this territory seems to have been able to secure contracts for a full year beginning with July 1. No inquiries have as yet come from railroads for bridges to replace those destroyed in the recent Ohio floods, although there has been some demand on warehouses for structural material for quick repair work. The city of Cleveland is advertising for a second-hand bridge to replace one over the Cuyahoga River destroyed during the floods. The structural situation is generally quiet, no new inquiries having come out for building work. The general manufacturing situation in Ohio has practically been restored to a normal basis. Plants that were interfered with because of conditions growing out of the floods are now running about as usual and consuming their normal amount of steel. The Lackawanna Steel Company has taken 1500 tons of rails for the Ann Arbor Railroad and there is new inquiry from Toledo for 500 tons of standard sections for a belt line railroad. Sheets are in good demand and prices are firm. The demand for iron bars is only moderate, with prices unchanged at 1.60c. to 1.65c., Cleveland. Warehouse prices are unchanged at 2.10c. to 2.25c., Cleveland.

Old Material.—The market is weak and quiet. Mills are taking material quite freely on contract but are buying very little scrap, sales being confined to small lots that are being offered at low prices. There are no inquiries for good sized tonnages. Cast scrap is lower but other prices are unchanged. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton.

Old steel rails, rerolling	$14.50 to $15.00
Old iron rails	16.00 to 16.50
Steel car axles	18.75 to 19.25
Heavy melting steel	12.75 to 13.00
Old carwheels	15.00 to 15.50
Relaying rails, 50 lb. and over	23.00 to 25.00
Agricultural malleable	11.75 to 12.00
Railroad malleable	13.50 to 14.00
Light bundled sheet scrap	10.00 to 10.50

Per Net Ton.

Iron car axles	$21.00 to $21.50
Cast borings	7.50 to 8.00
Iron and steel turnings and drillings	6.00 to 6.25
Steel axle turnings	9.00 to 9.25
No. 1 busheling	11.50 to 12.00
No. 1 railroad wrought	13.25 to 13.50
No. 1 cast	12.25 to 12.50
Stove plate	9.00 to 9.50
Bundled tin scrap	11.00 to 11.50

Birmingham

BIRMINGHAM, ALA., April 14, 1913.

Pig Iron.—The Southern pig-iron market shows some concessions from the $13 basis for No. 2 foundry iron. High waters in consuming territory shut off delivery and cut off new inquiry. One furnace interest is known to have sold at $12.50 and it is understood that considerable pig iron is available at that figure in Alabama, although few interests concede that price. An offer of a round lot for delivery on the Pacific coast is said to have been made on this basis. On the other hand one furnace company sold 1000 tons on a basis of $13.25, though it is explained that this iron is sought for special qualities. Sales of several thousand tons have been made on a $13 basis and small lots from a carload up to 250 tons are bringing $13 as a rule. The March production was the largest in the history of the industry in this State, but was made with fewer furnaces than would formerly have been required. The Alabama stacks are in good shape as a rule, many of them having been repaired during the past eighteen months. There are 7 stacks on basic, 18 on foundry and 2 on charcoal iron. Sales of charcoal iron are made at $25 to $25.50, with the active stacks well sold for several months ahead. Accumulations remain about the same, furnace stocks increasing while warrant and resale irons were taken out. The volume of business is not great. Bearing in mind that not all furnace interests have yielded to the $12.50 basis, minimum prices for quick delivery and second half per gross ton at furnaces are given in the first column below:

No. 1 foundry and soft	$13.00 to $13.50
No. 2 foundry and soft	12.50 to 13.00
No. 3 foundry	12.25 to 12.75
No. 4 foundry	12.00 to 12.50
Gray forge	11.75 to 12.25
Basic	13.00 to 13.50
Charcoal	25.00 to 25.50

Cast-Iron Pipe.—The water-pipe companies are receiving small orders, but no large ones have been placed. Manufacturers are not expecting any considerable activity in some time, but they are going ahead with plant operation and stocks are accumulating. The eyes of both maker and purchaser are on the iron market, and pending contracts are unclosed on account of its fluctuations. We quote $23.50 for 4 in. and $21.50 for 6 in. and over, with $1 added for gas pipe.

Coal and Coke.—The spring coal season has been satisfactory, although several domestic yards carried a considerable supply over on account of the mild winter. The mines are operating on full time, generally speaking, and recent rumors of labor troubles have died out, the miners appearing to have taken little interest in the proposed reorganization of their union. Coke does not vary in demand or price. Furnace coke continues to rule at $3 to $3.50 per net ton of 2000 lb., f.o.b. ovens, and foundry from $3.50 to $4, with as high as $4.25 paid for the very best grades. All coke plants are in full operation.

Old Material.—Scrap is weak and yards are accumulating stock. Light cast and stove plate are sold at concessions from the quoted list, and other grades are moving slowly. Steel is in fair demand. Prices are not adhered to and the buyers are said to be making terms in the majority of transactions. Quotations per gross ton of 2240 lb., f.o.b. dealers' yards, are as follows:

Old iron axles	$15.50 to $16.00
Old steel axles	15.50 to 16.00
Old iron rails	13.50 to 14.00
No. 1 railroad wrought	12.50 to 13.50
No. 2 railroad wrought	10.50 to 11.50
No. 1 country wrought	10.00 to 10.50
No. 2 country wrought	9.00 to 9.50
No. 1 machinery cast	10.00 to 10.50
No. 1 steel scrap	10.50 to 11.00
Tram carwheels	11.00 to 11.50
Standard carwheels	12.50 to 13.00
Light cast and stove plates	9.00 to 9.50

Cincinnati

CINCINNATI, OHIO, April 15, 1913.

Pig Iron.—The majority of melters in this immediate territory are too busy getting their plants started again to take any interest in the pig-iron market. While a number of foundries have resumed operations, several of the larger ones will be unable to light up for two weeks. The softening of prices in both the Southern and Northern producing districts is possibly another retarding feature, as many buyers profess to be of the opinion that rock bottom has not yet been reached. As previously mentioned, several Southern furnaces are openly quoting $12.50, Birmingham basis, on second-quarter business, and it is reported that one or two have been booking orders at this figure for shipment in the last half. Rumors as to slight concessions being made for spot shipment cannot be confirmed. Northern iron is also weak, and $15.50, Ironton, for second quarter, and in some instances for third quarter, has been done. A number of local agencies report a fair amount of both Southern and Northern iron sold in small lots to fill in. There are also several inquiries out, the largest of which is for 2000 to 3000 tons of mixed Southern and Northern foundry iron, from central Indiana, for last-half shipment. A Kentucky melter wants approximately 500 tons of Southern Nos. 2 and 3 foundry for the same delivery, and there are a number of smaller requests for prices on foundry iron from Indiana, Michigan and a few from Ohio consumers. It is reported that a large basic user in this territory is feeling the market, but no definite inquiry has yet been put out. Based on freight rates of $3.25 from Birmingham and $1.20 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 foundry and 1 soft	$16.25 to $16.75
Southern coke, No. 2 foundry and 2 soft	15.75 to 16.25
Southern coke, No. 3 foundry	15.50 to 16.00
Southern, No. 4 foundry	15.25 to 15.75
Southern gray forge	15.00 to 15.50
Ohio silvery, 8 per cent. silicon	20.20 to 20.70
Southern Ohio coke, No. 1	17.20 to 17.70
Southern Ohio coke, No. 2	16.70 to 17.20
Southern Ohio coke, No. 3	16.45 to 16.95
Southern Ohio malleable Bessemer	17.20
Basic, Northern	16.70 to 17.20
Lake Superior charcoal	18.75 to 19.25
Standard Southern carwheel	27.25 to 27.75

Coke.—The railroad situation has not yet been straightened out, and shipments to nearly all points are much delayed. The return of empty cars to the producing districts has been so retarded that it will probably be 30 days before anything like normal deliveries can be made. It is reported that side tracks at ovens are full of loaded cars that are unable to go forward, and storage racks have about all the coke they can hold. Enough furnace coke has filtered through to the southern Ohio furnaces to keep them in operation. Leading

brands of 48-hr. coke are bringing from $2.25 to $2.50 per net ton at oven, with 72-hr. brands quoted around $3 to $3.50 in all fields.

Finished Material.—A few of the local warehouses were able to get through small outside shipments as early as April 7, but there is yet an embargo on most points. Not much new business is coming in, with the exception of orders for sheets, and the problem now is to take care of customers on previous bookings. A local scarcity of empty cars is also a source of annoyance. The warehouse price on steel bars is around 2.15c. and on structural shapes 2.15c. to 2.25c. The local sheet mill was able to start up April 14.

Old Material.—Prices are off about 25c. a ton on all grades of scrap material and are still weak. The consumption by foundries in this immediate territory is very limited, and outgoing shipments are still delayed. Two of the larger dealers in Cincinnati suffered considerably from the overflow, but they have now cleaned up and are in fairly good shape. The minimum figures given below represent what dealers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards:

	Per Gross Ton.	
Bundled sheet scrap	$10.00 to	$10.50
Old iron rails	13.50 to	14.00
Relaying rails, 50 lb. and up	20.50 to	21.00
Rerolling steel rails	12.50 to	13.00
Melting steel rails	10.50 to	11.00
Old carwheels	12.25 to	12.75
	Per Net Ton.	
No. 1 railroad wrought	$10.50 to	$11.00
Cast borings	6.25 to	6.75
Steel turnings	6.25 to	6.75
No. 1 cast scrap	10.25 to	10.75
Burnt scrap	7.50 to	8.00
Old iron axles	17.75 to	18.25
Locomotive tires (smooth inside)	11.50 to	12.00
Pipes and flues	7.00 to	7.50
Malleable and steel scrap	8.75 to	9.25
Railroad tank and sheet scrap	5.75 to	6.25

Boston

BOSTON, MASS., April 15, 1913.

Old Material.—Transactions total a considerable business, but in small lots, and the volume is hardly sufficient to give a line on real market values. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of $2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices:

Heavy melting steel	$11.50 to	$11.75
Low phosphorus steel	13.50 to	14.50
Old steel axles	14.50 to	15.00
Old iron axles	22.50 to	23.00
Mixed shafting	13.50 to	13.75
No. 1 wrought and soft steel	10.75 to	11.00
Skeleton (bundled)	9.00 to	9.50
Wrought-iron pipe	10.00 to	10.25
Cotton ties (bundled)	9.50 to	9.75
No. 2 light	4.00 to	4.50
Wrought turnings	7.50 to	7.75
Cast borings	7.50 to	7.75
Machinery, cast	13.50 to	14.00
Malleable	10.50 to	11.00
Stove plate	8.50 to	9.00
Grate bars	7.50 to	7.75
Cast-iron carwheels	15.00 to	15.50

San Francisco

SAN FRANCISCO, CAL., April 8, 1913.

Consuming requirements in most lines continue large, and there is every indication that activity will be well maintained through the second quarter. Buyers, however, are becoming more cautious, regarding prospects for the more distant future as highly uncertian, and purchases are about as nearly on a hand-to-mouth order as conditions of delivery will permit. Merchants report sales still somewhat ahead of last year, but have considerable stock which they wish to clean up.

Bars.—The movement of soft steel bars keeps up on about the former scale. Supplies in store are moderate, but sufficient for the current jobbing business, and neither merchants nor manufacturers are disposed to buy far in advance of present requirements, though specifications are coming out well. Better delivery conditions are expected soon to remove the necessity for carrying large stocks. The market for reinforcing material continues strong, and a premium is still obtained on frequent sales for prompt delivery. Large inquiries are now appearing for outside construction projects, and building requirements are increasing, keeping the local output well sold for some time in advance. Jobbing prices remain at 2.75c. for steel and 2.65c. for iron.

Structural Material.—The local building record for March was comparatively low, but a marked improvement is noted in other cities and there is work in prospect requiring a heavy tonnage. The largest business of late has come from Los Angeles, where the Home Builders' steel contract has been let to the Llewellyn Iron Works. The same company is said to have contracts for the Merchants' National Bank building and the Hotel Rosslyn, Los Angeles, and the Roebling warehouse job has been let to the Baker Iron Works. The Central Iron Works has about 300 tons for a theatre on O'Farrell street, this city. Preparations are being completed for the Engineers' building at First and Mission streets, and figures are being taken for the Aronson building at New Montgomery and Mission streets. Aside from the numerous plans under way, the most encouraging feature is the activity in downtown lots, which are apparently being purchased for building purposes. Fabricators are still hampered somewhat by scarcity of material, but deliveries are gradually improving.

Rails.—Business has been fairly active the last fortnight, with some rather large orders for standard sections. Several expected inquiries from interurban roads have not yet materialized, but logging firms are coming into the market for rails up to 50-lb. sections, and more business is expected from similar sources. There is also a more active call for light rails and track equipment for development work throughout the coast States. A lot of girder rails and general supplies have been ordered for the local belt railroad, and it is announced that 10 miles of standard gauge track will be laid in the Exposition grounds.

Sheets.—While neither jobbers nor manufacturers appear in any rush to place contracts for forward delivery, current specifications are coming out at a lively rate, and considerable new business is offered for prompt shipment. The most insistent demand is for hard red and blue annealed, on which deliveries have been backward. Supplies of other lines are sufficient for current needs. Some increase is noted in building requirements, while the demand for sheet pipe and other products continues very active.

Plates.—The only demand of much importance at present is for tank construction, but in this line orders are coming out in good shape. Several oil companies are increasing their storage and distributing facilities at many points, and waterworks and gas tank inquiries are numerous. The Western Pipe & Steel Company has taken a contract for a large gas holder at Santa Paula, Cal.

Merchant Pipe.—About the strongest item at present is lap-weld pipe for waterworks and irrigation purposes. The oil-field business is again in the doldrums, and the regular distributive movement has been below expectations for the last two months. Merchants are holding off almost entirely, and some low prices are said to have been made by mill agents without getting much response. Prices have so far been steadily held in the jobbing trade, but the heavy stocks are beginning to be burdensome, and merchants are becoming anxious to sell. The town of Redlands, Cal., is in the market for a lot of lap-weld pipe.

Cast-Iron Pipe.—Municipal business is coming out in somewhat better shape, and bids are being received this week for considerable tonnage, thet own of Suisun being out for about 2500 tons and Pasadena and Mayfield for smaller lots. Tucson, Ariz., is expected in the market shortly, and Tulare, Cal., will take bids May 1. New inquiries are expected within a few months from Oxnard and San Diego, and the city of Sacramento is considering a bond issue for important waterworks improvements. There is still some corporation buying, though the outlook for investment by public service corporations is rather uncertain. Prices remain at $36.50 for 4-in. and $34.50 for 6-in. or larger.

Pig Iron.—While current requirements are fairly large, the recent easing off of primary markets deters local melters from buying except for their most urgent needs. A good many scattering carloads are being taken for prompt shipment, but there is no large buying. Local prices have dropped, No. 2 Southern foundry being quoted at about $22.60 per gross ton.

Coke.—Foreign coke is rather scarce on the spot, and while there is no heavy movement prices are held at about $15.50 per net ton from yard. German Syndicate coke, to arrive, is weaker, as there has been considerable chartering of late. For May-June-July load-

a range of $12.50 to $13.50 per gross ton is quoted, and a fair tonnage is being taken at these figures. Southern coke, to arrive, is offered at $12 to $12.50 per net ton, but only a few cars are being sold.

Old Material.—With light supplies and an increasing demand, prices are advancing on all classes of scrap. There has been quite an urgent call for cast-iron scrap, and some heavy machinery scrap has been sold as high as $20, though the general quotation is about $18 per net ton. Local steel foundries and rolling mills are making liberal purchases of old rails, steel melting and wrought scrap, and relaying rails have been sold at $35. Deliveries of rerolling rails on old contracts have been completed, and offerings are now held around $17 per gross ton, while steel melting scrap is quoted at $13 per gross ton and wrought at $13 to $15.

Speculation Checks British Buying

Continental Weakness Also a Contributing Factor to Unsettled Situation

(By Cable)

MIDDLESBROUGH, ENGLAND, April 16, 1913.

The squeeze in Cleveland warrants continues and still checks buying by consumers. Blast furnacemen are getting anxious to sell. Stocks of warrant iron total 211,558 tons, against 210,752 tons one week ago.

Weakness is apparent in semi-finished material and prices of Belgium billets and German sheet bars are both nominal. There is no inquiry for the Belgian billets and the German Steel Works Union is asking a shilling above the market. There is no movement in sight as regards finished material. We quote as follows:

Cleveland pig-iron warrants (closing Tuesday), 66s. 1½d. against 65s. 6d., one week ago.

No. 3 Cleveland pig-iron makers' price, f.o.b. Middlesbrough, 66s. 6d. against 65s. 9d., one week ago.

Ferromanganese, £11 12s. 3d. f.o.b. shipping port.

Steel sheet bars (Welsh) delivered at works in Swansea Valley, £5 10s.

German sheet bars, f.o.b. Antwerp, nominally 103s., a decline of 7s.

German 2-in. billets, f.o.b. Antwerp, nominally 100s., a decline of 5s.

German basic steel bars, f.o.b. Antwerp, £5 15s.

Steel bars, export, f.o.b. Clyde, £8.

Steel joists, 15-in., export, f.o.b. Hull or Brimsby, £7 5s., a decline of 2s. 6d.

German joists, f.o.b. Antwerp, £5 12s. to £5 15s.

Steel strip plates, Scotch, delivered local yards, £8 7s. 6d.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £9 15s.

Steel rails, export, f.o.b. works port, £6 15s.

Tin plates, cokes, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 14s.

German Trade Does Not Improve

Pig Iron, Crude Steel and Rails Active But Other Branches are Quiet and Weak

BERLIN, April 3, 1913.

The reserved tone continues. Dealers in particular are still holding orders back from the mills in the expectation of better terms later. There is a general feeling of uncertainty. Even though the political situation appears to be clearing up, this fact has as yet had no influence on the trade. As far as the reports indicate, however, there have been no price changes since a week ago.

Across the border in Belgium, on the other hand, the drops in prices within the week have been more numerous than usual. On March 28 a Brussels dispatch reported a decline of 2.50 francs in the inland price of iron and steel bars and a similar cut on steel plates. Two days later falls of 2 shillings in the export price of bands, and one shilling of iron and steel bars, were reported. On top of these changes came a Brussels dispatch yesterday with news of further cuts. The home price of iron bars was reduced 2.50 franc to 172 to 177.50 francs, while the export price of all kinds of semi-finished steel was marked down 2 shillings.

The contrast in the German trade between crude material and finished products, as already described, continues unchanged. The former section of the trade is still doing very well; in the latter, while work is still going on actively, it is mostly on old orders. Unless a decided change for the better occurs soon, it seems highly probable that some sections of the finished steel trade will begin to complain of a shortage of orders by the middle of the year. The blast furnaces are all working at full capacity, and stocks are nowhere accumulating. Scrap holds its own well; although large supplies are coming on the market they are readily absorbed without affecting prices. Cast scrap is even reported to have recently improved slightly in price.

The good position of semi-manufactured steel has been fully maintained. Consumers have been buying actively since business for the current quarter was declared open and they have for the most part already placed orders for their full requirements.

Structural shapes are reported as somewhat more active, and the mills have enough work to keep them busy. No marked improvement in the home demand, however, is looked for until the political skies have cleared up and interest rates have returned to a more normal level. Foreign business in beams continues rather good, but not many new orders are coming in. Work on steel rails continues at the previous active pace.

The weak, dull tendency in the bar trade has not been relieved. It is admitted that orders for prompt delivery can be placed at 118 marks, which is fully 7 marks lower than the prices reached last fall.

The Rod Syndicate held a meeting at the end of last week to take action on the question of its renewal, but it adjourned to next week without doing anything. The efforts to convert the convention in tubing into a syndicate have been abandoned as hopeless. The trouble was, according to press reports, that some of the mills claimed excessively large allotments. The great Gelsenkirchen company demanded a big quota for a tube mill that does not yet exist.

St. Louis

ST. LOUIS, MO., April 14, 1913.

There are indications that a broader buying movement is near at hand. Consumers apparently are getting closer to a desire to contract ahead and there are also evidences that there are no reserves piled up to postpone contracting beyond the time estimated when allotments were made.

Pig Iron.—The taking of small lots was of a broader character. The largest sale was of 500 tons of No. 2 Southern foundry, but there was a considerably larger number of carload and 50-ton sales than for some time and these came from quarters indicating near future buying. Buying was done with less hesitancy than has been manifest of late, even in small lots. Inquiries continue in small figures, though there are more of them. The largest is one for 500 to 1000 tons of coke carwheel iron. The quotations here show a range of $12.50 to $13 No. 2 Southern, Birmingham basis. Some furnace representatives openly offer at the lower figure, while others decline business at less than the top. Some of the increased activity has been on the higher figure. Ohio iron is quotable at $16 for No. 2, Ironton basis, and No. 2 X Chicago, $17.25. Specifications generally are free and up to allotments.

Coke.—Representatives have been averse to seeking business because of difficulties in delivery and foundries are beginning to get nervous over the prospects of shortage of fuel. Quotations are nominally on the ovens basis, but in some cases, it is asserted, premiums would be paid for assured delivery. Specifications on contracts are heavy.

Finished Iron and Steel.—Consumers are taking all they can get, but are not making heavy new engagements. In standard steel rails there is considerable interest being shown by a number of small lines, but none of the large roads are as yet in the market. The lumber roads are figuring somewhat on light rails, but the coal interests are not taking much, this being their off season. Track fastenings are in better demand, much of the new interest being due to imperative repair work. The structural material market has been quiet in St. Louis, but the outlying territory is increasingly active. The only St. Louis transaction of consequence in immediate sight is one for a 10-story commercial building covering an entire block, for which details have not been completed. Bars are in excellent demand and deliveries are becoming more and more extended, while the demand is more insistent. Reinforcing bars are very active. The fabricating shops are taking their full allotments of structural material, while the wagon

and agricultural interests are taking material up to the limit of possibilities of delivery under present conditions. Generally customers are in good humor over prospects and orders are being placed for allotments far in advance of the usual time.

Old Material.—Little is doing and prices remain weak. The mills are out of the market and there is no profit to dealers in taking material here and shipping it elsewhere. There is little tonnage offering, the lists last reported being 200 tons from the Kansas City Southern and 500 tons from the Mobile & Ohio, which closed at low figures. Relaying rails are quiet. Generally dealers are merely filling requirements of customers. We quote dealers' prices f.o.b. St. Louis:

Per Gross Ton.

Old iron rails	$13.00 to $13.50
Old steel rails, rerolling	13.25 to 13.75
Old steel rails, less than 3 ft.	11.50 to 12.00
Relaying rails, standard section, subject to inspection	22.50 to 23.50
Old carwheels	14.50 to 15.00
Heavy melting steel scrap	11.25 to 11.75
Frogs, switches and guards, cut apart	11.00 to 11.50

Per Net Ton.

Iron fish plates	$11.50 to $12.00
Iron car axles	19.50 to 20.00
Steel car axles	17.00 to 17.50
No. 1 railroad wrought	11.25 to 11.75
No. 2 railroad wrought	11.00 to 11.50
Railway springs	9.50 to 10.00
Locomotive tires, smooth	11.00 to 11.50
Wrought arch bars and transoms	14.00 to 14.50
Steel couplers and knuckles	9.50 to 10.00
No. 1 dealers' forge	8.50 to 9.00
Mixed borings	6.00 to 6.50
No. 1 busheling	9.75 to 10.25
No. 1 boilers, cut to sheets and rings	6.50 to 7.00
No. 1 cast scrap	10.00 to 10.50
Stove plate and light cast scrap	8.00 to 8.50
Railroad malleable	9.50 to 10.00
Agricultural malleable	8.00 to 8.50
Pipes and flues	7.00 to 7.50
Railroad sheet and tank scrap	6.00 to 6.50
Railroad grate bars	7.50 to 8.00
Machine shop turnings	7.00 to 7.50
Bundled sheet scrap	6.25 to 6.75

The Interstate Scrap Iron Company has acquired the yards of the G. Mathes Iron & Metal Company, located at Adelaide and Bulwer avenues on the Terminal Railroad north belt, St. Louis, effective April 10. The new owner takes over the general scrap iron business of the Mathes Company, operating with its full equipment and excellent facilities for handling old material. M. M. Broad, formerly manager of the Mathes scrap iron department, will be active manager of the new company.

Buffalo

BUFFALO, N. Y., April 15, 1913.

Pig Iron.—Developments have induced buyers to come into the market for future needs. Inquiry continues to be received in abundant measure and is very general in character. Sales by furnaces in this district were again quite heavy, approximating the total volume of the previous week, which was the largest for some months past. It seems evident that melters drawing on this market have about concluded to close for quite extended requirements, many of them for the remainder of the year. Foundries are busy, particularly the medium size and smaller ones, and the aggregate melt is heavy. Specification on contracts keeps up at a remarkable rate and furnaces are shipping to the full amount of their production to meet this demand. We quote as follows, f.o.b. Buffalo, for second quarter and last half delivery:

No. 1 foundry	$16.25 to $16.50
No. 2 X foundry	16.00 to 16.25
No. 2 plain	16.00
No. 3 foundry	15.75 to 16.00
Gray forge	15.50 to 15.75
Malleable	16.25 to 16.75
Basic	16.50 to 17.25
Charcoal, regular brand and analysis	18.00 to 19.00
Charcoal, special brand and analysis	21.50

Finished Iron and Steel.—The market for tin plate has become very strong, due to the fact that tin plate and sheet mills of the Valley districts were the most seriously affected of any line of finished products by the recent floods, large quantities of stock being spoiled in mill warehouses and an unusually large proportion of sheet bar mills being closed down by high water. This resulted in an attempt on the part of consumers to buy in the open market. Business in steel bars, plates and shapes is running in about the same volume as for some weeks past, with deliveries as far extended as ever, and specifications are coming in freely against contracts. Wrought steel pipe has been advanced ½ point, owing to heavy demand and the fact that it has not heretofore been brought up in price in proportion to the advance in semi-finished materials. The structural steel market is very active and a large amount of work is being figured on. The Atlas Steel Casting Company is taking bids on 120 tons for extensions and bids on revised plans are being received for the Michael Theater Building, 150 tons. The Buffalo Structural Steel Company has the contract for the Meyer Malting Company's addition, 200 tons. The C. F. Ernst & Sons Company has 150 tons for the St. Monica School and Assembly Building and was low bidder for the Buffalo Maintenance Company's building, 170 tons, and for Public School No. 57 addition, 140 tons.

Old Material.—There has been no material change in conditions except that heavy melting has declined and wrought iron and soft steel turnings and cast borings seem to be in better demand and prices for them have advanced 25c. per ton. The market for borings has shown considerable activity. In other commodities the market is quiet and prices remain practically the same as a week ago. There is no local demand this week for heavy melting scrap, the principal user being out of the market for the time being. Dealers are therefore obliged to reduce prices sufficiently to sell to outside districts. We quote as follows per gross ton, f.o.b. Buffalo:

Heavy melting steel	$12.00 to $12.75
Boiler plate, sheared	15.00 to 15.50
No. 1 busheling scrap	11.50 to 12.00
No. 2 busheling scrap	9.00 to 9.50
Low phosphorus steel	17.00 to 17.50
Old iron rails	15.00 to 15.50
No. 1 railroad wrought	14.00 to 14.50
No. 1 railroad and machinery cast scrap	13.75 to 14.25
Old steel axles	17.50 to 18.00
Old iron axles	24.00 to 24.50
Old carwheels	15.00 to 15.50
Railroad malleable	13.25 to 13.75
Locomotive grate bars	10.50 to 11.00
Stove plate (net ton)	9.75 to 10.00
Wrought pipe	10.00 to 10.50
Wrought iron and soft steel turnings	8.25 to 8.50
Clean cast borings	8.00 to 8.25
Bundled tin scrap	17.00

New York

NEW YORK, April 16, 1913.

Pig Iron.—In the latter part of last week quite a little business was done by eastern Pennsylvania furnaces for delivery in New Jersey and in eastern Pennsylvania. The largest pipe interest has been taking iron in considerable quantities and a maker of sanitary pipe whose purchase of 4500 tons for its western New York plant was reported last week also closed for its foundries in New Jersey and eastern Pennsylvania. Low prices were named on these contracts, which amounted to about 8000 tons for the two last-named foundries, as low as $16 at eastern Pennsylvania furnaces being done on No. 2 X. Some furnaces are holding for $16.50 for such iron. A New Jersey interest has bought 2500 tons of No. 2 X and a sale is reported to a New York State foundry amounting to several thousand tons. Little additional buying has been done this week. There are indications that a few melters, believing that the low prices quoted by some furnaces represent a close approach to the turning point, have closed quietly; on the other hand instances are known in which buyers have evidently been led to wait because of the very considerable concession offered from prices that had been the nominal market. Some sellers give reasons for finding a better feeling in the market, but no transactions are reported which would show that makers are taking any firmer stand. Little has been done in Virginia iron, but $15 at furnace for No. 2 X is in line with what is named in other districts. Few Buffalo sales for Eastern shipment are reported but on competitive business somewhat below $16 at furnace for No. 2 X is possible. We quote as follows for Northern iron at tidewater: No. 1 foundry, $17.50 to $18; No. 2 X, $17 to $17.50; No. 2 plain, $16.75 to $17.25. Southern iron is quoted at $17.50 to $17.75 for No. 1 foundry and $17 to $17.25 for No. 2.

Structural Material.—Railroad work is conspicuous in recent structural awards and much of the material settled for buildings lies outside of the Metropolitan district. The result is aggravation of the trying conditions which fabricators are likely to face in this section if more projects are not soon brought to a conclusion. Fabricating capacity here is large and for some time contracting has been below the average necessary to keep all busy. Early delivery material is easier in both price and time, more of it going at 1.35c.

Pittsburgh and a few weeks sufficing with some mills to insure rollings. It seems likely, however, that the earlier obtained material commands 1.60c. Pittsburgh, and the lower rate named covers chiefly shipments in eight to ten weeks. The New Haven has closed with the American Bridge Company for 225 tons at Pawtucket and the 1300 tons for the Maine Central has been taken also by the American Bridge Company. The Pennsylvania Steel Company has taken 1600 tons for the Boston & Albany; the Jones & Laughlin Steel Company 750 tons for the National Lead Company at Port Richmond, Staten Island; the Providence Steel & Iron Company, 200 tons for a garage in Boston; the Passaic Steel Company 500 tons for an apartment on West Fifty-first street, New York, and the Alfred E. Norton Company 800 tons for a loft on West Thirty-second street, New York. Quotations for plain material are 1.61c. to 1.66c. New York for mill shipments in the third and fourth quarters; 1.71c. to 1.76c. New York for delivery in three to eight weeks and for lots from store, 2.15c. New York.

Plates.—One of the interesting developments is the withdrawal of separate inquiries each for about 2000 tons for a large manufacturing interest for last half made doubtless to discover if mills asking the $2 and $3 advances per ton over Pittsburgh mills would make price concessions. The failure to secure a reduction indicates that both buyer and seller are willing to await developments. While deliveries remain about the same, mostly three weeks and more with Eastern mills, universal plates have, it is learned, been sold in some cases at the same level as sheared plates. The lull in car buying continues, with car builders, however, heavily booked. Quotations are 1.61c. to 1.66c. New York for mill shipments in the fourth quarter and 1.76c. for shipment in three to four weeks.

Bars.—The strength of steel bars is indicated in the fact that in some small sizes new business cannot be promised before December. With other sizes obtainable more often than not in five to seven months, it is felt that the near future is to hear more than formerly of premium business for urgent shipment. One mill, for example, had to refuse over 200 tons for delivery in 30 and 60 days. The optimism of the bar market is in marked contrast to the general conditions which would be calculated ordinarily to put the check of conservatism on buying. Spring building operations have not as yet become conspicuously apparent and it may be that the open winter has spread this demand partly over the months that have already passed. Bar iron orders continue to come in good volume, but spikes have eased up a bit and these and rivets are obtainable in two to four weeks. Bolts require about 6 weeks. Steel bars are quoted at 1.56c. New York for deliveries four and more months hence, while refined iron bars are held at 1.65 to 1.75c. New York. Store prices for steel bars are 2.05c. and for iron bars 2.10c.

Ferroalloys.—The price quoted by the producers' representatives for 50 per cent. ferromanganese continues at $61, Baltimore, which is considered nominal, although there has been a little buying at that figure. Some speculative material has sold between $60 and 61. The market is quiet, with an inquiry out for a couple of hundred tons of spot shipment only. Any sale of large quantity would bring the full price. A cable from London received this week says that a scarcity is developing on the other side. For 50 per cent. ferrosilicon there is inquiry for about 100 tons for fairly prompt shipment. The price is unchanged at Pittsburgh for $75 for carloads, $75 for 100 tons and $73 for 600 tons and over. Difficulty is being experienced in getting 11 to 15 per cent. ferrosilicon from the Hanging Rock district, Ohio, where flood conditions have caused furnaces to shut down and freight transportation is demoralized.

Cast-Iron Pipe.—The opening of bids on the contract for the extension of the New York City high pressure fire protection system was postponed from April 9 to April 21. No new public lettings of importance are announced for this territory. Numerous inquiries are being received from abroad because of the sold up condition of English cast-iron pipe foundries. As these inquiries are almost invariably based on English specifications for pipe, which are not followed on this side of the Atlantic, our pipe makers have little prospect of securing such business. Among the foreign inquiries are a number from Canada which will probably result in some business to foundries near the border. Private buying is somewhat irregular, the volume being under that of the past month. Prices on carload lots of 6 in. continue to range from $23.50 to $25, per net ton, tidewater.

Old Material.—Wrought scrap has been in some demand, while steel scrap has been exceedingly dull. Cast scrap is in fair inquiry. The general outlook seems to favor lower prices on old material. Dealers' quotations are as follows, per gross ton, New York City and vicinity:

Old girder and T rails for melting	$10.75 to $11.25
Heavy melting steel scrap	10.75 to 11.25
Relaying rails	22.00 to 22.50
Rerolling rails (nominal)	14.00 to 14.50
Iron car axles	24.00 to 24.50
Old steel car axles	15.75 to 16.25
No. 1 railroad wrought	13.25 to 13.75
Wrought-iron track scrap	12.25 to 12.75
No. 1 yard wrought, long	12.00 to 12.50
No. 1 yard wrought, short	11.00 to 11.50
Light iron (nominal)	4.50 to 5.00
Cast borings	8.00 to 8.50
Wrought turnings	8.25 to 8.75
Wrought pipe	10.75 to 11.25
Old carwheels	14.50 to 15.00
No. 1 heavy cast, broken up	11.25 to 11.75
Stove plate	8.75 to 9.25
Locomotive grate bars	8.00 to 8.50
Malleable cast	11.00 to 11.50

Metal Market

NEW YORK, April 16, 1913.

The Week's Prices

Cents Per Pound for Early Delivery.

	Copper, New York.			Lead		Spelter	
April	Lake.	Electrolytic.	Tin, New York.	New York.	St. Louis.	New York.	St. Louis.
10	15.62½	15.37½	48.65	4.35	4.20	5.90	5.75
11	15.62½	15.37½	48.90	4.35	4.20	5.90	5.75
12	15.62½	15.37½	.....	4.35	4.20	5.90	5.75
14	15.75	15.50	50.00	4.35	4.20	5.75	5.60
15	15.75	15.50	49.50	4.35	4.20	5.75	5.60
16	15.75	15.50	49.50	4.35	4.20	5.75	5.60

Copper buying is heavy and prices are higher. Tin has advanced but is excessively dull. Lead is steady at unchanged prices. Spelter is lower and weak. Antimony is dull and the market soft.

New York

Copper.—Domestic buying has eased off, but it is still of excellent proportions and purchasing on behalf of Europe is unabated. The market is very strong, with Lake quoted at 15.75c., cash, although practically nominal for the reason that producers are well sold up, especially for April and May, and at present it is not so much a question of buying as of obtaining delivery. One grade of Lake is quoted at 15.62½c., but it is inferior in quality to standard prime Lake. For electrolytic the quotation is 15.62½c., delivered, cash 30 days, or 15.50c., cash, New York, with a tendency on the part of some sellers to ask a few points more. The deliveries are heavy. The exports this month total 15,976 tons, which is not quite up to the heavy rate of last month, but still a very good showing. The price in London to-day is £68 8s. 9d. for spot and £68 11s. 3d. for futures.

Pig Tin.—Heavy fluctuations in London have acted to restrict trading here and the result has been an excessively dull market covering the entire week. What little business has been done has been at a great sacrifice in price. On Monday the London market advanced £6 10s., but dropped £2 10s. yesterday. Consumers have very little faith in the situation, a result of which is instanced by the case of one buyer who usually takes 5-ton lots but cut his purchase down to 1 ton. The upset condition abroad is attributed in the first place to heavy buying by a large London house on Monday and second to the covering of short contracts by bear operators. Incidentally there is talk of the influence of Vienna speculators. On Monday list tin reached 50c. but to-day is quoted at 49.50c., New York. The London price is £227 5s. for spot and £221 15s. for futures. The immediate future gives promise of further violent ups and downs in the London market until all the short interests are covered. There is afloat 2360 tons and the arrivals this month have been 1540 tons.

Lead.—The market is quiet but shows an improvement in tone, especially in St. Louis. The quotation in New York continues at 4.35c. and in St. Louis at 4.20c., although small sales have been made in the West at 4.22½c. Last week business was done at 4.17½c., St. Louis, but the market gained strength on Monday of this week. It is generally conceded that the tariff situation is holding lead to its present level.

Spelter.—This metal is very dull and the market is weak at 5.75c. to 5.87½c., New York, and 5.60c., St. Louis, having declined sharply on Monday last. The decline came about through offerings at the lower prices.

Antimony.—It is felt that there will not be any material change until the tariff is settled, as the rate

proposed by the new schedule will mean cheaper metal for consumers and they naturally are inclined to hold off. The import cost of Hallett's is 8.60c., but the metal is being sacrificed at below that figure in what business is being done. One buyer has asserted that he bought Hallett's at 8.15c., but this is admittedly an exceptional case. Cookson's is quoted at 9c., Hallett's at 8.50c., with strong likelihood of this price being shaded, and Chinese and Hungarian grades at 7.62½c.

Old Metals.—The demand for copper continues good. Dealers' selling prices have again been advanced and are now as follows:

	Cents per lb.
Copper, heavy and crucible	15.25 to 15.50
Copper, heavy and wire	14.75 to 15.00
Copper, light and bottoms	13.75 to 14.00
Brass, heavy	10.00 to 10.25
Brass, light	8.50 to 8.75
Heavy machine composition	13.75 to 14.00
Clean brass turnings	8.75 to 9.00
Composition turnings	11.50 to 12.50
Lead, heavy	4.00
Lead, tea	3.75
Zinc, scrap	4.75

Chicago

April 15.—With the exception of spelter, the metals occupy a stronger position than a week ago. Copper quotations show tendencies toward higher levels, but as yet vary through such a range as to make average values approximately as last quoted. Tin prices are higher, on an easier London money market and a better statistical position. Scrap metals also show some improvement and slightly higher prices are obtainable from dealers. We quote as follows: Casting copper, 15.50c.; Lake, 15.75c., in carloads for prompt shipment; small lots, ¼c. to ⅜c. higher; pig tin, carloads, 50.75c.; small lots, 52.75c.; lead, desilverized, 4.30c. to 4.35c. for 50-ton lots; corroding, 4.55c. to 4.60c. for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 5.75c. to 5.85c.; Cookson's antimony, 10.50c., and other grades, 9.75c., in small lots; sheet zinc is $8, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600-lb. casks. On old metals, we quote buying price for less than carload lots; Copper wire, crucible shapes, 13.25c.; copper bottoms, 12c.; copper clips, 13c.; red brass, 12.25c.; yellow brass, 9.25c.; lead pipe, 3.80c.; zinc, 4.35c.; pewter, No. 1, 33c.; tinfoil, 39c.; block tin pipe, 45c.

St. Louis

April 14.—A rather quiet feeling has prevailed, though the week closed with prices a little firmer as follows: Lead, 4.20c.; spelter, 5.70c.; Lake copper, 16.10c.; electrolytic copper, 15.97½c.; tin, 49.30c. to 49.85c.; antimony, Cookson's, 9.35c. In the Joplin ore market the basis range for the week was $42 to $44 per ton for 60 per cent. zinc sulphide, while the choicer grades brought as high as $47; second grades, $40 to $42. Calamine brought $20 for 40 per cent. and the choicer grades up to $24. Lead ore was slightly weaker at $52.50 for 80 per cent. Generally speaking the district is in good shape and there is no serious disturbance apparent as yet over tariff changes. On miscellaneous scrap metals we quote as follows: Light brass, 6c.; heavy brass and light copper 9.50c.; heavy copper and copper wire, 11c.; pewter, 25c.; tinfoil, 34c.; zinc, 4c.; lead, 3.50c.; tea lead, 3c.

During the week of April 7 the heads of departments and managers of various offices of Robert W. Hunt & Co., engineers, bureau of inspection, tests and consultation, met with the firm at the general office in Chicago in annual conference. Papers on the various methods of conducting the work of inspection and testing were discussed, and on Thursday and Friday a party was taken on inspection trips to Gary, South Chicago and Buffington. Among those present from the out-of-town offices were J. B. Emerson, St. Louis; W. B. Gester, San Francisco; G. E. Herrmann, Vancouver; J. C. Ogden, New York; H. C. Parker and H. C. Watrous, Pittsburgh, and Charles Warnock, Montreal.

A strike of the members of the International Brotherhood of Foundry Employees in the St. Louis industrial district is impending over a demand for an increase in pay of 25c. per day. The union is composed of laborers, but if they go out they will affect the core-makers, finishers, buffers and others to the number of about 2000. Several foundries have tentatively agreed to the increase, but a majority have refused. The foundries are unusually busy at this time and a strike would be a serious matter to the industry.

Iron and Industrial Stocks

New York, April 16, 1913.

The course of the stock market has been persistently downward, notwithstanding more favorable developments in Europe. Tariff revision is having some effect on values, and the condition of the money market seems to have put a damper on those who were endeavoring to bring about an advance in securities. Disinclination of banks to accept some industrial securities as collateral for loans has caused further recession in new stocks such as those of the Rumely Company. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Am. Can, com.	33	- 38¼	Nat. En. & St., com.	14	- 14¾
Am. Can, pref.	95⅝	- 98½	Pressed Steel, com.	26	- 28¼
Am. Car & Fdy., com.	50⅛	- 52⅝	Railway Spring, com.	34	- 34¼
Am. Loco., com.	36	- 37½	Railway Spring, pref.		98
Am. Loco., pref.	103¼		Republic, com.	24⅜	- 27¼
Am. Steel Foundries	36		Republic, pref.	84½	- 86
Bald. Loco., com.	46	- 48	Rumely Co., com.	28⅞	- 37¼
Bald. Loco., pref.	104¾		Rumely Co., pref.	71½	- 80
Beth. Steel, com.	34⅛	- 36	Pipe, pref.		51
Beth. Steel, pref.	71	- 72⅛	U. S. Steel, com.	61½	- 64⅛
Colorado Fuel	34¼	- 35½	U. S. Steel, pref.	108	-109
Deere & Co., pref.	97½	- 98	Va. I. C. & Coke		50
General Electric	140	-141½	Westinghouse Elec.	63¾	- 66
Gr. N. Ore Cert.	35½	- 38⅛	Am. Ship, com.	52	- 53
Int. Harv., com.	105	-106½	Chic. Pneu. Tool.	49⅝	- 51½
Int. Harv., new.	104⅞	-106½	Cambria Steel	50⅜	- 51⅜
Int. Harv., pref.	112		Pa. Steel, pref.	77	- 79
Int. Harv. Corp.	105		Crucible Steel, com.	15⅜	- 15¾
Int. Harv. Corp., pref.	112½		Crucible Steel, pref.	91⅜	- 92
Int. Pump, com.	10¼	- 11¾	Harb. Wk. Ref., com.		48
Int. Pump, pref.	37		La Belle Iron, com.	40	- 43½
Lackawanna Steel	40	- 41½			

Dividends Declared

The Crocker-Wheeler Company, regular quarterly, 1¾ per cent. on the preferred and 1½ per cent. on the common stock, payable April 15

The Warwick Iron & Steel Company, regular semi-annual, 4 per cent., payable May 15.

The Ingersoll-Rand Company, regular annual dividend on the common stock of 5 per cent. in cash, also 25 per cent. in stock. Cash dividend is payable April 30 and stock dividend May 1.

The International Steam Pump Company has passed its quarterly of 1½ per cent. on the preferred stock, paid regularly since 1900. The directors state that business conditions since the beginning of the calendar year have been of a disappointing nature; that while no new competition has arisen, the existing competition is, if anything, sharper that at any time in the history of the company. For the first half of the current fiscal year, partly estimated, net earnings were well in excess of bond interest and preferred dividends of subsidiary companies.

Under the auspices of J. G. Butler, Jr., and the Youngstown Playground Association, Henry B. B. Yergason of Rogers, Brown & Co., presented the "Mine to Molder" motion pictures of that firm at Youngstown, Ohio, April 10. The exhibitions this week were on April 14 and April 16, the former at the bi-monthly meeting of the Traffic Club of Pittsburgh at the Hotel Schenley, and the latter at Wilmerding, Pa., under the auspices of the Westinghouse Air Brake Company.

The Leetonia Steel Company has placed a mortgage on its blast furnace and real estate for $1,000,000 to cover an issue of 6 per cent. 20-year bonds and to provide funds for completing its building plans including an open-hearth steel plant, blooming and sheet bar mills at Leetonia, Ohio. The company expects to be making steel for the open market by next fall. Later it will add sheet mills to its equipment and produce electrical and special grades of black sheets.

L. Vogelstein & Co., 42 Broadway, New York, furnish the following figures of German consumption of foreign copper for the months of January and February, 1913: Imports, 32,395 tons; exports, 1520 tons; consumption, 30,875 tons, compared with consumption during the same period in 1912 of 32,072 tons. Of the imports as stated, 26,995 tons came from the United States.

It is probable that one of the two new blast furnaces of the Pittsburgh Steel Company at Monessen, Pa., will be blown in this month and that the second will follow shortly after.

Personal

William R. Willcox, recently chairman of the Public Service Commission of the first district of New York, which has been engaged in the subway extensions for Greater New York, has been elected president of the Efficiency Society, 29 West Thirty-ninth street, New York.

H. L. Williams, resident partner of Hickman, Williams & Co., at Chicago, sailed April 13 from New York for a Mediterranean trip, expecting to return about June 15.

George Hills, for several years manager of the welding department of the Garwood Electric Company and the C & C Electric & Mfg. Company, Garwood, N. J., has resigned his position and is now associated with the Electric Welding Materials Company, 149 Broadway, New York.

Burton L. Verner has been appointed department manager of the Western department of the U. S. Metal & Mfg. Company, with headquarters in the McCormick Building, Chicago, succeeding to the position formerly held by James S. Miller, who recently resigned. Mr. Verner was formerly with the Republic Iron & Steel Company, and recently has been associated with the Highland Iron & Steel Company, having in charge its Blue Island plant.

Charles A. Barnes, who for the past 10 years has been associated with the Charles Dreifus Company, iron and steel scrap merchant, Pennsylvania Building, Philadelphia, Pa., has resigned, having accepted the position of general manager for Luria Brothers & Co., scrap merchants, with headquarters in Reading, Pa., and operating large scrap yards at Lebanon, Pa.

Adolph F. Ellfeldt, president and treasurer of the Ellfeldt Hardware & Machinists' Supply Company, Kansas City, Mo., will visit Germany, his old home, and other parts of Europe, spending the months from May to August abroad. He will be accompanied by his two sons, Fred and Ralph.

Samuel F. Pryor, St. Louis, has been elected a director of the Baldwin Locomotive Works. E. C. Converse recently resigned.

George E. Edmunds and William Jones, of the Edmund & Jones Mfg. Company, Detroit, Mich., have been elected president and treasurer respectively of the American Lamp & Stamping Company, a new corporation organized to manufacture automobile lamps at Ford City, Ont.

Charles H. Green, Ridgewood, N. J., has been appointed chief of the department of manufactures and varied industries of the Panama-Pacific International Exposition, San Francisco, and has assumed active charge. In the past 10 years he has been connected in various capacities with more than 40 industrial expositions and trade shows.

Prof. Charles E. von Barneveld, head of the mining department of the University of Minnesota, has been appointed chief of the department of mines and metallurgy in the division of exhibits of the Panama-Pacific International Exposition, San Francisco.

J. E. Thropp, Jr., who recently resigned as superintendent of blast furnaces of the Inland Steel Company, Indiana Harbor, Ind., has gone to Everett, Pa., as general manager of the blast furnaces, ore mines, coal and coke works and quarries of Joseph E. Thropp.

Dr. E. F. Roeber, editor of Chemical and Metallurgical Engineering, New York, was elected president of the American Electrochemical Society at its recent meeting at Atlantic City.

Samuel F. Keim has been appointed purchasing agent of the Juragua Iron Company, iron ore subsidiary of the Bethlehem Steel Company, South Bethlehem, Pa., succeeding the late Robert Carey, to whom he was assistant.

H. Lee Moore, formerly in the Pittsburgh office of the Buffalo Forge Company, has been appointed sales engineer, in charge of the company's Cincinnati territory, succeeding A. J. Chinn, who has resigned to go into other business. Offices will be retained at 505 Mercantile Library Building.

George Beard, a veteran in the iron and steel business and past president of the West of Scotland Iron and Steel Institute, is seriously ill at his home in Glasgow, Scotland. His son, Ambrose Beard, general sales manager for the West Penn Steel Company, Brackenridge, Pa., sailed for Glasgow Saturday, April 12.

C. C. Henderson has been appointed general manager of sales for the Allegheny Steel Company, Brackenridge, Pa., and J. A. Armstrong has been appointed his assistant.

H. F. Martin, who has been general sales manager of the Pennsylvania Steel Company for about 10 years and recently resigned, has taken a similar position with the Eveland Engineering & Mfg. Company, 2326 Market street, Philadelphia. William M. Baldwin, treasurer of the Standard Roller Bearing Company for a number of years, has resigned and has been appointed controller of the Eveland Company. Arthur S. Day, formerly manager of the Philadelphia office of Hill, Clarke & Co., Inc., has since April 1 been connected with the sales force of the Eveland Company.

Steel Corporation Improvements

A considerable programme of reconstruction and improvement is planned or is now in progress at plants of Steel Corporation subsidiaries. Reference has been made to the changes now under way at the Lorain, Ohio, plant of the National Tube Company, including additions to the rolling equipment in the pipe mills. New stoves are also to be built at two of the Lorain blast furnaces. Recently an appropriation was made for the reconstruction of the Pennsylvania works of the National Tube Company, on Second avenue, Pittsburgh. This will give practically a new plant.

Plans have been made for the complete rehabilitation of the Aetna-Standard works of the American Sheet & Tin Plate Company at Bridgeport, Ohio. This plant was originally built in 1872 and has been enlarged from time to time. The product is black and galvanized sheets. Much of the machinery is to be replaced and the plant reconstructed.

A Taylor-Wharton Acquisition

The Taylor-Wharton Iron & Steel Company, which has works at High Bridge and Plainfield, N. J., and Philadelphia and Jenkintown, Pa., has acquired the Tioga Steel & Iron Company, Philadelphia, the change becoming effective April 15. A meeting of the stockholders of the Tioga Company will be held April 24, when officers will be elected representing the new owners. The product of the Tioga plant is iron and steel forgings and under the new control the forging work of the Taylor-Wharton Iron & Steel Company will be done at West Philadelphia. An important addition to the product will be forged manganese steel. Heretofore the operations of the Taylor-Wharton interests have been confined to manganese steel castings.

Thatcher Hoyt and Paul E. Noe have organized the Hoyt-Noe Steel Company and have opened offices and warehouse at the southwest corner of Monroe and Jefferson streets, Chicago. They will carry high-grade and standard qualities of high-speed and crucible carbon tool steels, drill rods, machinery and spring steel, cold-rolled strips and other special steels. Mr. Hoyt has been a dealer in iron and steel in Chicago on his own account for some years, and Mr. Noe has represented manufacturers of crucible steels for 20 years. In the past seven years he has been Western representative of the Braeburn Steel Company; prior to that he represented Singer, Nimick & Co., and earlier, the Sanderson Brothers Steel Company.

The Steel Corporation Suit.—Monday, May 12, is the date now set for the beginning of hearings at New York on behalf of the Steel Corporation in the dissolution suit brought by the United States Government. It is expected that the presentation of the Steel Corporation's case will take the greater part of a year.

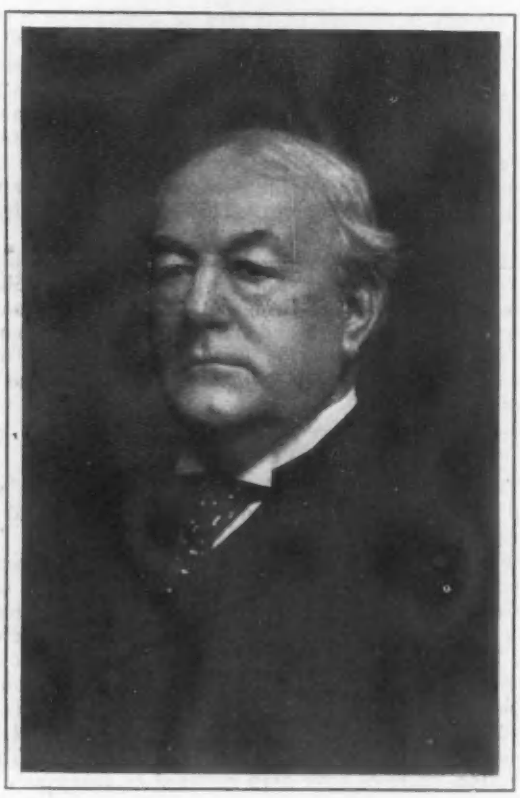
The Detroit pig iron offices of M. A. Hanna & Co., Oliver Phelps, manager, have been removed to 2118 Dime Bank Building.

The Carrie furnace of the Carnegie Steel Company at Rankin, Pa., will be blown out for relining April 22.

Obituary

L. E. Cochran

Lucius E. Cochran, president Youngstown Iron & Steel Company, Youngstown, Ohio, and long prominent in iron and steel manufacture in the Mahoning Valley, died of pneumonia at Cairo, Egypt, April 12. For some weeks Mr. and Mrs. Cochran had been traveling abroad. Born in Delaware County, Ohio, June, 1842, and educated in the public schools of Lawrence County, Pa., and at Duff's College, Pittsburgh, Mr. Cochran moved to Youngstown in 1862 and entered the employ of Goble, McClelland & Co. Later he was an employee of Andrews & Hitchcock. He became a member of the firm of Andrews Brothers & Co., and in 1883, when the Andrews Prothers Company was organized, he became president, treasurer and general manager. The new company took in the Niles Iron Company, and the Niles mills were moved to Haselton, where Andrews Brothers & Co. had operated a



L. E. COCHRAN

blast furnace. Following the formation of the Republic Iron & Steel Company in 1899 Mr. Cochran disposed of his interest in Andrews Brothers Company to the consolidation. He then organized the Youngstown Iron & Steel Roofing Company, which is now the Youngstown Iron & Steel Company. It operates sheet and light plate mills at Haselton. Mr. Cochran was the organizer of the Western Steel Company at St. Louis, and when the Ohio Steel Company at Youngstown was formed in the early eighteen-nineties he became a director of that company. He was a director also of the Youngstown Car Manufacturing Company and the Youngstown Bridge Company, president of the Youngstown Pressed Steel Company, and was interested in the Mahoning & Shenango Dock Company, also in the Mahoning Ore Company. He was a member of the American Iron and Steel Institute. C. A. Cochran, his only son, is secretary of the Youngstown Iron & Steel Company.

CHARLES H. PARSONS, New Britain, Conn., first vice-president of the American Hardware Corporation, died April 13. He was born in New Britain in 1847. After completing his education in the high school and a commercial college, he entered the employ of Landers, Frary & Clark as salesman. After seven years he accepted a similar position with P. & F. Corbin, and in 1880 became general sales manager for that house. In 1891 he was made a director, and after serving as second and first vice-presidents was made president. When the American Hardware Corporation was formed Mr. Parsons was elected a director and assistant treasurer, and finally became first vice-president. He was conspicuously active and useful in the civic as well as the manufacturing affairs of his city.

CHARLES J. HODGE, former president of the Hodge Iron Works, Houghton, Mich., died suddenly at his home in Detroit, Mich., April 10, aged 56 years. He retired from active business about four years ago on account of failing health.

EDWARD ORSON HOPKINS, a former president of the Sloss-Sheffield Steel & Iron Company, but of recent years general manager of the Indiana Tie Company, died in Chicago April 3, aged 55 years.

MRS. ANNA H. TUTHILL, Chicago, died March 11, aged 87 years. She had been the vice-president of the Tuthilll Spring Company, of that city, for 15 years, although not active in business.

WILLIAM E. DEWEY, vice-president and general manager of the Columbia Screw Company, died last week at his home in Chicago, aged 55 years. He leaves a widow.

WILLIAM WORTH BURSON, Rockford, Ill., whose inventions in connection with harvesting machinery and more particularly automatic knitting machinery have been developed by the Burson Mfg. Company of that city, died suddenly April 10, aged 80 years.

GEORGE ELI HAWLEY, a retired iron dealer, died April 8 at St. Louis, Mo., aged 91 years. He was associated in his early business career with John J. Mitchell of Chicago, but severed the connection to enter the iron and steel business in St. Louis from which he retired about 10 years ago. His firm at that time was known as the Paddock-Hawley Iron Company.

The Halcomb Steel Company, Syracuse, N. Y., announces that its Western branch is occupying new offices and warehouse at 608 West Adams street, Chicago. The new quarters have twice as much warehouse room as the former location and are especially designed and equipped with the best facilities for the company's complete line of high grade crucible tool steel and electric furnace alloy steels. Garson Myers is Western branch manager.

The Hooven, Owens, Rentschler Company, Hamilton, Ohio, shipped last week five carloads of Corliss engines to the Honolulu Iron Works, Honolulu, Hawaiian Islands, and two carloads to the United States Government for use at Panama. The company is rapidly recovering from the effects of the floods, as these shipments indicate.

The Vulcan Engineering Sales Company, Fisher Building, Chicago, Ill., which controls the entire product of the Hanna Engineering Works, of that city, has sold and shipped 100 tons of riveting machines in the past three months. The factory is actively employed, being weeks behind in deliveries.

Hannah furnace of the Republic Iron & Steel Company at Youngstown, Ohio, has been blown in, having been out for about six weeks for relining and repairs. No. 1 Haselton furnace is now out for relining and for the rebuilding of three of its stoves.

The Youngstown Sheet & Tube Company, Youngstown, Ohio, expects to have some of its open hearth furnaces making steel by May 1. It is further working with the intention of putting the new D blast furnace in operation by July 1.

Lawrence furnace of the Marting Iron & Steel Company, Ironton, Ohio, which has been out of blast for relining for a number of weeks, will blow in about April 21.

The A. & F. Brown Company, whose works are at Elizabethport, N. J., will remove its offices and store on May 1 from 172 Fulton street to 53 Barclay street, New York.

Joint Triple Supply Conventions

(*Continued from page 951*)

neering specialties should segregate the overhead expenses of each department and apply them on the direct labor basis, while another plant making a similar line should use a general percentage and distribute it in the relation to the cost of both material and labor.

"If there is anything in connection with the distribution of burden which is decidedly wrong it is the practice of applying a general burden in shops producing a variety of work which passes through a number of departments in which equipment and processes are different. Regardless of what plan of distribution is used, there should be a distinct burden charge for each department. If any manufacturer thinks a general burden is even approximately correct, all he has to do to disprove his opinion is to ascertain the overhead charges for each department in his own plant, determine a burden rate for each and compare the difference in the costs of certain products.

"There are many cases where a manufacturer finds that he can meet a competitor's prices on one class of goods but not on another. This condition is often due to the fact that the one plant applies the same burden on the product as a whole, while the other uses a different burden for each department."

Conservation of the Business Man

Willard Parker, Pennsylvania Shafting Company, Spring City, Pa., was unable to be present, but his paper on "Conservation of the American Business Man" was read by C. H. Jenkins, Moran Flexible Steam Joint Company, Louisville, Ky. The importance of the subject was set forth by Mr. Parker as follows:

"If 20 years ago some good angel could have stood over the gas wells of Indiana with a stop-cock perhaps there would have been some gas left for present and coming generations. If 40 years ago Gifford Pinchot could have gotten in some of his work in the Michigan forests perhaps wood pulleys would not now be made in Michigan from wood brought across the continent. But all the natural resources of our land sink into insignificance before her greatest asset, the American business man, and he is being wasted and destroyed with a recklessness besides which the blowing out of our gas wells and the spoliation of our forests are the picture of economy. My prescription is simple and I believe if properly applied almost infallible. It consists of suitable mental and physical activity, absolutely unconnected with money."

On Saturday morning, in addition to the closing business of the convention, two papers were read. One was on the "Distribution and Sale of Manufactured Products," by Adrian D. Joyce, general sales manager Sherwin-Williams Company, Cleveland, Ohio. In the absence of J. A. Beynon, Dodge Mfg. Company, his paper, "Business Correspondence," was presented by D. J. Campbell, of the same company.

Resolutions Passed By Manufacturers

At the closing session Farnham Yardley, Jenkins Bros., New York, chairman of the resolution committee, presented several measures which met the approval of that committee and all were adopted. One pertained to a proposed workmen's compensation act submitted by the labor legislation committee of the association. It was voted that the president of the association appoint one or more members in each state to co-operate with the proper officials in bringing the proposed act before the various state legislatures. Other resolutions were:

Whereas, The National Drainage Congress has been commissioned by President Wilson of the United States of America, to formulate and present to the nation a comprehensive national plan for drainage and flood control to prevent loss of life and property by floods; And Whereas, Said Drainage Congress in meeting assembled at the city of St. Louis, April 10-12, 1913, has prepared the draft of a bill to be presented to the United States Congress giving the United States full control and supervision over the work of protecting the people of the country from floods and overflows; now therefore be it resolved

By the National Supply and Machinery Dealers' Association, the American Supply and Machinery Manufacturers' Association, and the Southern Supply and Machinery Dealers' Association, in joint convention assembled at the Claypool Hotel, Indianapolis, Indiana, this tenth day of April, 1913;

That we hereby endorse the purpose and work of said National Drainage Congress, and that we urge the Congress of the United States to take immediate action along the lines advocated by the National Drainage Congress to protect the people from floods and overflow.

Be it further resolved that copies of this resolution be forwarded by the Secretary to the members of the United States Senate and House of Representatives.

Resolutions of thanks were passed for courtesies given by the citizens of Indianapolis, various clubs and civic bodies and the speakers of the conventions. The Southern Supply and Machinery Dealers' Association having passed a resolution in which the giving of confidential rebates to favored customers was condemned, the American Association acted as follows:

The American Supply and Machinery Manufacturers' Association received with appreciation the resolution of the Southern Supply and Machinery Dealers' Association deprecating a giving of confidential rebates, confidential commissions or confidential reductions and otherwise deviating from the generally accepted principles of a square deal in business.

Another resolution amended the constitution and created an associate membership to which the trade press and others who have affiliations with the active members are eligible. Other resolutions follow:

The American Supply and Machinery Manufacturers' Association is deeply moved at the destruction of property and the hardship that has been caused by the unprecedented weather conditions in this vicinity, and wish to extend to the sufferers their sympathy, and to express the hope that their trouble will soon be brought to an end.

The American Supply and Machinery Manufacturers' Association deems this an appropriate opportunity for placing on record their commendation of the effective services rendered by our Secretary-Treasurer, F. D. Mitchell. We know that Mr. Mitchell has the best interests of our organization at heart, and his untiring labors and unfailing courtesy commend him for our appreciation.

National Association of Dealers

The National Supply and Machinery Dealers' Association considered an interesting selection of topics pertaining to the business problems of its members. The retiring president, W. L. Rogers, Pittsburgh Gage & Supply Company, Pittsburgh, Pa., presided and in his annual address delivered at the opening session, said in part:

"There have been some features of association work which it has not been wise to follow during the past year or two. We have seen that the Government has looked with disapproval upon the doing of many things by dealers operating together. Ten years ago such efforts and aims were considered proper and entirely within the law. The law has not been changed, but the present interpretation of the law is quite different. There is a tendency upon the part of the public, the courts and Congress to take away from the manufacturer of patented goods the right to dictate or set resale prices. If this right is taken away from the manufacturer of patented goods, the jobber cannot lawfully maintain resale prices on such articles. I do not know to what extent this will be carried out and I would be very sorry indeed to see any such legislation enacted.

"I have always believed that it was for the best interests of the public at large that resale prices should be firmly established upon many of the goods which we handle. The Government enforces a one-price system in freight rates, in tolls exacted by public service corporations, and apparently feels that a one-price system is right and fair in many lines controlled by agents of the Government. I cannot see wherein a one-price system operates against public interest, and I hope that you will promptly take the matter up with your congressmen when our secretary writes asking that you ask your congressmen to use their influence against Section 32 of the Oldfield bill, which provides that manufacturers of patented goods shall not be permitted to dictate the selling price.

"It is a pleasure to advise our members that during the past year we have had very few complaints regarding manufacturers' competition. The few complaints received were given prompt attention, and in nearly every instance it has been clearly shown that the manufacturers desired above everything else to protect their friends among the jobbers.

"The secretary-treasurer, in his annual report, calls attention to what he designates 'Short Margin Lines of

Goods.' He alludes to goods on which the gross profit is in the neighborhood of $10 for every $100 worth of goods sold, whereas the selling expense is about $15 per $100 worth of goods. I think that if this convention can suggest some practical means of getting a better profit on twist drills, bolts, nuts, files, wood screws, waste and a number of other important lines it will have accomplished a great deal. We hear of quotations on such goods as these which provide for a gross profit only of 2½ or 5 per cent."

C. S. Farquhar Elected President

Officers were elected by the National Association at its closing session as follows: President, Charles S. Farquhar, Chandler & Farquhar Company, Boston, Mass.; first vice-president, Henry Prentiss, Prentiss Tool & Supply Company, New York City (in charge of machinery interests); second vice-president, J. O. Harron, Harron, Rickard & McCone, San Francisco, Cal. Advisory Board, Edgar E. Strong, Strong, Carlisle & Hammond Company, Cleveland, Ohio; George Puchta, Queen City Supply Company, Cincinnati, Ohio; W. M. Pattison, W. M. Pattison Supply Company, Cleveland, Ohio. Executive Committee: W. A. Ridings, Syracuse Supply Company, Syracuse, N. Y.; M. B. Barkley, Cameron & Barkley Company, Charleston, S. C.; George Vonnegut, Vonnegut Hardware Company, Indianapolis, Ind.; W. T. Todd, Somers, Fitler & Todd Company, Pittsburgh, Pa., and W. L. Rogers, Pittsburgh Gage & Supply Company, Pittsburgh, Pa.

Some of the Topics Discussed

Discussion brought out at the morning session of April 10 that the members favored a nominal volume of business at a profit rather than a large volume without a legitimate profit, and it was decided also that co-operation was advisable in securing better prices, more business, better profits, satisfied customers and consequent success. The report of the treasurer, Thomas A. Fernley, submitted on Friday morning, showed that the finances of the National Association were in good condition. It was decided at this session that manufacturers should be asked for better prices, where it is necessary, to permit dealers to meet the condition created by the extension of manufacturers' lowest prices to retailers and consumers, the consensus of opinion being that mill supply dealers who carry large and well-assorted stocks should be able to sell at as low a price as the manufacturer. In the case of short margin lines it was contended that they should be placed on a proper profit-yielding basis. A discussion regarding the compensation of salesmen established the general view that they should receive a fair, straight salary and expenses and no commission. The discussion was opened by F. W. Swanson, Globe Machinery & Supply Company, Des Moines, Iowa.

In the course of an exchange of views on the cost of doing business the vote usual at annual meetings was taken and the average cost was announced as 15.7 per cent. The report of the membership committee showed the association to have gained ten new members, making a total of 162.

It was the opinion of the members, following discussion, that manufacturers' established selling prices are being respected as a rule, one reason given being that profits are low enough. Dealers, it was declared, should be in a position to sell as low as the manufacturers. That mill supply dealers cannot continually cut prices and remain solvent was the decision at the close of another discussion. In an address on "Salesmanship—Up to What Standard Do Salesmen in the Mill Supply and Machinery Business Measure," W. T. Todd, Somers, Fitler & Todd Company, Pittsburgh, told in an interesting manner of the many qualities which a salesman must possess and exercise to obtain success and on the topic of "truthfulness" said:

Integrity in Business Makes Permanent Success

"Any business to grow and be successful must treat its customers fairly and honestly. A cute trick may give slight temporary advantage, but the foundation of the house must be laid with strict integrity and honesty of purpose if customers are to be retained and repeated orders expected and their numbers multiplied as the years roll by.

"When a salesman recommends a certain article for a certain class of work, he should do so with strict integrity and the goods must be right for the purpose intended and must be honestly sold, thereby making the transaction mutually beneficial to both parties.

"Under these conditions the customer soon forgets that he paid a good price for the article, but will never forget the salesman or the house he represents 'that made good,' and when in the market again he will then have an opportunity to serve him and also recommend him to his friends. This requires, in all cases, not only the hearty co-operation of the salesman with the organization he represents, but also the very best individual efforts of each one having any part in the transaction.

"To give your customer the best you know for the smallest safe price is the best general proposition today."

Would Handle Malleable Fittings Differently

H. H. Rudd, the George Worthington Company, Cleveland, Ohio, at the Friday afternoon session, read a paper on the advantages of selling malleable fittings on a price list basis and not by the pound, and also the advisability of having the smaller sizes of malleable fittings pack in uniform quantities according to size. In part Mr. Rudd said:

"If we were to ascertain the cost of extra time consumed in weighing in and weighing out malleable fittings, I am sure we would all be of one mind to eliminate the loss in weight and excessive cost of handling and ask the makers we buy from to give us the goods on the piece list instead of by the pound. But if malleable fittings were placed on the piece list our excessive cost of handling would not be entirely eliminated until we adopted some plan of having same packed in uniform packages of, say, 50 or 100 of a size. If five years ago malleable fittings had been packed in uniform packages, I venture to say we would be sending out today 85 per cent. of our fittings in that manner. What percentage of machine bolts do we sell in uniform packages? Is it not 90 or 95 per cent.? They at one time were put up the same as fittings are now, all loose and had to be counted out. I am certain if once a line of uniform packages is established 75 per cent. of the trade will much prefer to buy them that way."

Mr. Rudd also advocated that plugs, bushings and nipples of small sizes be put up in uniform packages and so save the expense of counting out. He also said:

"I asked a large number of jobbers of fittings in several states for an expression on the subject by sending them the following letter:

"'Would you not favor a plan to have all malleable fittings billed by the manufacturers on the piece list and resold to the jobber on the piece list, thereby eliminating any loss in weight, also to have all smaller sizes fittings, say 2 in. and smaller, packed in uniform packages, as are bolts and most all other lines of goods. This would materially reduce the cost of handling. May we have an expression from you on this subject?'

"Of the replies, from 75 to 80 per cent. were in favor of the suggested change and hoped it might be arranged. One jobber believed it would reduce the cost of handling malleable fittings 66⅔ per cent., while another said he had realized for a long time that the cost of handling malleable fittings was more than the profit on them."

The association adopted a resolution introduced by Secretary Fernley providing for a committee of three to be appointed by the president to accumulate facts and figures showing the difference in cost and saving of time where distributers to the consuming trade is done through the mill supply dealers instead of directly by manufacturers. The latter are to receive the data gathered.

Southern Dealers Elect I. F. Young

The Southern Supply and Machinery Dealers' Association held the usual number of sessions and carried out the programme recently printed in *The Iron Age*. Many topics of interest and importance to the jobber were discussed at length. At the last session officers were elected as follows: President, I. F. Young, Young & Vann Supply Company, Birmingham, Ala.; first vice-president, J. A. Harvin, Peden Iron & Steel Company, Houston, Tex.; second vice-president, J. G. Belding, Lombard Iron Works & Supply Company, Augusta, Ga.; secretary and treasurer, Alvin M. Smith, Smith-Courtney Company, Richmond, Va.

executive committee: S. M. Price, S. M. Price Machinery Company, Norfolk, Va.; George H. Manning, Knoxville, Tenn.; J. G. Barkley, Cameron & Barkley Company, Tampa, Fla., and Ernest Howell, Capital City Supply Company, Charleston, W. Va.

Secretary-treasurer Alvin M. Smith stated in his report that relations with the other supply associations were amicable and that with the manufacturers they were on the whole satisfactory also. He said that in some matters the manufacturers are not as keen in co-operating as might be desired and as an instance he referred to occasional sales to retailers, fake dealers and "curbstone" brokers. With regard to such cases, Mr. Smith said he felt that a manufacturer who indulges in this practice "is either trying to carry water on both shoulders or his sales and credit departments are badly organized." He summed up as follows various points which should be urged upon the manufacturers by the dealer:

Suggestions Urged Upon Manufacturers

"1—Adequate protection wherever they quote or sell direct to the consumer, 'curbstone' broker or others who do not carry legitimate stocks. It is manifestly unfair to those of us who carry stocks and become thereby a part of the manufacturers' sales organization.

"2—Not to withhold shipments placed at low prices and ship later orders placed at higher prices. It has been claimed by some of our members that this has been done on a rising market.

"3—Not to change list prices, but to correct selling prices by changing discounts.

"4—Adequate profits on all lines. There are many lines on which the profits are so small that they do not cover cost of handling. Among these goods are shafting, set and cap screws, drills, some makes of files, waste, bolts, nuts, washers, bar iron, nails, spikes, crucible cast steel, soft steel, leather belting and machinery of nearly all kinds.

"5—Not to ask us to send out advertising matter on which our name is left off."

Mr. Smith reiterated a recommendation that local associations be formed to work in harmony with the general body. On the subject of uniform prices, he said:

"The manufacturers have become restive under the Government's activity against the so-called trusts and their trade agreements. Nevertheless, I am of the opinion that it is eminently fair and just for a manufacturer to advise his distributers and his own sales organization that a minimum price has been set on his goods and request that such price be observed. There should be no place in the trade for 'commercial pirates' and when prices are cut and demoralization brought about so that an article becomes an unprofitable one for us to sell, then I contend that the manufacturer of such an article has the moral and legal right to withdraw his prices from the 'commercial pirates' who bring about such conditions."

Mr. Smith also touched on the parcel post, which his association opposed. Under the circumstances he said members must make the best of the present law, but they "should be ready to fight any further extensions which will open up the markets of the entire country to the mail order catalogue houses." He expressed the opinion that manufacturers should exercise more care in seeing that mail order houses do not cut prices, and censured those jobbers who complain of price cutting yet will do it themselves and then declare their course was compelled by competition. In concluding his report Mr. Smith said that the past year had been a good one for business and that there was nothing to indicate a change from satisfactory conditions. Tariff and anti-trust measures at Washington cannot prevent healthy business from continuing and honest business men need have no fear that they will be hampered by the new administration.

The association was addressed by Charles R. Crane, Crane Company, Chicago, on the morning of April 11.

Presentations to Messrs. Rogers and Gladding

At the closing meeting of the American Association the newly elected officers of the Southern and National associations were invited to the room and there followed mutual introductions of the new executives and their chief assistants to each other and the members. Short addresses were made by Presidents Swartwout, Young and Farquhar and Secretaries Smith and T. James Fernley. W. M. Pattison, W. M. Pattison Supply Company, Cleveland, made a graceful speech leading to the presentation, on the part of the National Association, of a silver dish and flower vase to W. L. Rogers, former president of the National Association. The entertainment features of the convention were most successful. They included a reception at the home of Mrs. E. C. Atkins and other social functions for the visiting ladies, a "get-together" meeting with refreshments and music and dancing on the first evening of the convention, a theater party and supper at the Deutscher Club and a visit to the Indianapolis Motor Speedway, where a 15-mile automobile race was run. A special train carried the party to the Speedway. At the Deutscher Club supper D. K. Swartwout, at the end of a humorous speech in which he feigned administering an obligation to N. A. Gladding, presented the latter with a silver flower vase as a token of esteem from his fellow members of the American Association. Many speeches were made during the supper, including one by John Trix, American Injector Company, Detroit, Mich., who asked for a little kindness for the manufacturer, and M. W. Mix, Dodge Mfg. Company, Mishawaka, Ind.

The time and place of the next convention is not yet decided, but the matter is in the hands of a joint committee. The Southern Association was said to favor Houston, Tex., while the National was in favor, unofficially, of Hot Springs, Va.

Special Work in Shop Safety and Sanitation

In a recent issue of American Industries is an article by Dr. Francis D. Patterson, director of the department of sanitation and accident prevention of Harrison Bros. & Co., Inc., Philadelphia, dealing with "Sanitation and Safety in Heavy Chemical Production." Much of the work done at this plant in the interest of employees is typical of what the leaders in the safety and sanitation campaigns in various industries are carrying on; very much of it also is special, in view of the dry grinding of lead and other operations which require precautions for the guarding of health.

All applicants for employment are given a physical examination and in this way those who present the evidences of a physical defect which impairs their health, and makes them more liable to an accident, are barred from employment. Every effort is made to maintain employees in good health by the provision of properly lit and ventilated rooms, and when ill they are urged to consult the medical director, on the company's time, without charge, with the result that many ailments, which might become more serious, are cured without loss of time to the employees. Every accident is investigated, not only with the object of determining why it happened, but so that the necessary measures may be taken to prevent an accident from a similar cause occurring again. Special facts in connection with any accident and general remarks on the subject of safety are brought to the attention of all employees by being printed and placed on the 48 safety bulletin boards which are located in prominent positions.

What has been accomplished is indicated by the decrease in the number of accidents. In the month of October, or the month previous to the beginning of the campaign, there were 44 accidents; in November, 36 accidents, a decrease of 18.1 per cent.; in December, 36 accidents, a decrease of 18.1 per cent. from the previous month and a decrease of 36.2 per cent. from October. In January there were 21 accidents, a decrease of 15.9 per cent. from the previous month, or a total decrease of 52.1 per cent.

The Braeburn Steel Company, Braeburn, Pa., has added to its plant one new heating furnace. As the old furnaces burn out it is changing them from gas to direct coal-fired. It has also installed new gas producers at the crucible furnace and has ordered a 500-ton hydraulic press. Other improvements added are a hardening and tempering plant and testing machines for the physical laboratory. This equipment is primarily intended for the company's own experimental work in aiding it to improve and keep uniform the quality of its output. While the warehouse capacity has been doubled the mill capacity is not increased; all the changes made have been in the interest of economic production and uniformity of output.

Fuel Economics of the Oil Engine*

Gasoline Production and Prices and the Case of the Automobile Kerosene Engine —Differences Between Oil and Gasoline

BY JOHN A. SECOR

The power-driven vehicle can no longer depend on its present fuel. The demand for gasoline has overtaken production. During the last decade the oil market has been readjusting itself to radically new conditions. This has been brought about by many new applications of oil products for developing heat and power. Crude oil was formerly looked upon simply as the raw material for the production of illuminating and lubricating oils. The invention and perfection of the gasoline motor, and its application to the automobile and power boat dates back to the high-speed gasoline engine of Gottlieb Daimler. The introduction of the Daimler motor opened up an entirely new market for the lighter oils, gasoline and naphtha, which market developed within the short period of ten years into larger proportions than the most optimistic oil men ever dreamed of. Under these conditions the inexorable law of supply and demand brought about a price level for the volatile distillates far in excess of former values.

Supply, Demand and Prices

For nearly half a century price advances were extremely moderate; the fluctuating market quotations of gasoline were ordinarily within narrow limits. An approximate general statement would be that the mean increase in price, barring fluctuations, was about one mill per annum per gallon—equalling 1 cent per decade. The total sum of these price increments had brought gasoline from, say, 5 cents up to 10 cents per gallon in tank car lots at the close of 1911. But last year an unparalleled increase of 6 cents raised the wholesale price to 16 cents per gallon at the close of the year. In 1912 the wholesale price, therefore, advanced 60 per cent. and the retail price about 75 per cent. Furthermore, it should be noted that the low cost gasoline of the early days varied in gravity from 70 deg. to 76 deg. Baumé, averaging 72 or 73 deg., whereas the gasoline now marketed is about 10 deg. lower. This 62 or 64-deg. product was formerly sold under the trade name of benzine.

United States Government reports show that the advancing price of gasoline is due solely to inevasible laws of supply and demand. No corporation or combination of corporations is responsible for the fact that demand has overtaken production, and that further increases in prices are now impending. American gasolines and naphthas were formerly obtained solely from high-grade paraffine crude oils of Pennsylvania and Ohio. These are the most valuable oils in the world. Highest-grade Pennsylvania crude now actually brings the same price as refined kerosene in bulk. But unfortunately Pennsylvania production has fallen from 33,000,000 bbl. in 1891 to about 9,000,000 bbl. at the present time. However, at present prices even this decreased production represents over $18,000,000. Ohio production has decreased from 24,000,000 bbl. in 1896 to less than 9,000,000 bbl. during the year last past. The zenith of production of Indiana was in 1894—over 11,000,000 bbl. The present yield shows a shrinkage of nearly 90 per cent. from maximum. The United States Geological Survey states that the general decline in production "would doubtless have been much greater but for the effort to apply laws of supply and demand by increases of prices. Prices advanced so greatly during the year as to stimulate drilling, even in the old New York and Pennsylvania pools, and so checked the decline. Formerly this plan has not been so successful. In the mid-continent field also it checked the decline, so that the product will come within 4,000,000 bbl. of the maximum output."

In Canada production has fallen off one-third from the highest of five years ago. The only new field in sight is at Tampico, in Mexico, which has grown from nothing three years ago to 6,000,000 bbl. in 1912. About the only home fields not showing decreased output are in California and Oklahoma. Three-fifths of the total yield now comes from these two states. And even the increased output of Oklahoma was insufficient to prevent a continuous reduction of stock on hand in 1912. Ninety per cent. of the entire output of more than 220,000,000 bbl. was crude oils which yield a very low percentage of gasoline.

The following market prices of Eastern, Mid-Continent and Western crudes are fairly indicative of their relative gasoline content:

Pennsylvania	$2.05 per bbl.
Indiana	1.23 per bbl.
Oklahoma and Kansas	.83 per bbl.
California	.35 per bbl.

These prices of crude oil were corrected as of January 25, 1913. Since that time Pennsylvania crude was advanced 7 cents a barrel on each of three successive days, standing now at $2.50, and $3-oil is freely predicted.

In order to obtain a single gallon of gasoline from refinable California petroleum it is necessary to produce as by-products 9 gal. of kerosene and 30 gal. of residual oils. Notwithstanding the steadily increasing output of Western oil the price of gasoline on the Coast continues to advance. It is now 30 cents per gallon at retail. Large shipments of Texas oil formerly came to the Atlantic seaboard in tank steamers, but these have decreased as the Texas oil yield is now less than one-third the 1905 output. In view of the Texas shrinkage it is obvious that the opening of the Panama Canal will furnish a large Eastern market for California oil, but it is equally obvious that under existing conditions that will not materially affect the gasoline situation.

Means of Increasing the Supply of Gasoline

There are five different methods of increasing the normal visible supply of gasoline. One is importation. The Standard Oil Company has imported some Russian naphtha, but Russia has no more to spare, as her own oil output is diminishing to such an extent as to increase the price 100 per cent. in the last two years, and to warrant the Russian Government in the promotion of alcohol production. The Shell Oil Company, of England, has also shipped some gasoline from Borneo to Canada, but the total quantity available abroad is insufficient for home demands. America is still exporting gasoline to foreign markets at the rate of 15,000,000 to 20,000,000 gal. per month.

Another and more promising means of obtaining gasoline is by increasing the total yield of American crude oils. A yearly production of 300,000,000 bbl. in the United States is probably being approached faster than even oil men generally believe. But the largest increase in the production of gasoline in one year has never been more than 5 per cent., while the production of power-driven vehicles will in all probability represent an increase this year of around 100 per cent. Furthermore, as already shown, the supply of gasoline yielding crude oils is rapidly decreasing; the increased crude output will consist of Oklahoma and California asphalt oils, having insufficient gasoline for existing requirements.

The third means of supplementing the gasoline supply is the production of gasoline from kerosene. Chemists have known for some time that it is entirely feasible to extract gasoline from the chemically complex kerosene, as well as from coal, coal tar and even wood. It is simply a question of cost, and of the profitable disposal of resultant by-products. Gasoline is now being made from kerosene, and a further increase in price will stimulate an increased output.

A fourth source of gasoline supply is its manufacture from natural gas by compression, and its subsequent condensation to a liquid form. It is claimed that this process produced 13,000 gal. in 1910, which was increased to 50,000 gal. in 1911 and about twice as much in 1912. Some of

*From a paper read before the Indiana section of the Society of Automobile Engineers.

the richer gases produce as much as 8 gal. per 1000 cu. ft., but the average is from 3 to 5½ gal. By triple and quadruple compression up to pressures as high as 400 lb., very light liquids as high as 85 deg. Baumé are produced, these being slightly more stable than the products of fractional distillation.

The fifth and last means of increasing the available gasoline supply is by lowering the Baumé gravity. It is probable that the specific gravity of commercial gasoline will be dropped another notch by next summer. Much of the liquefied-gas gasoline is used for blending with heavier distillates, and naturally other than gravity tests are required to determine the characteristics of such blended gasolines.

With the exception of importation the various methods of augmenting the available quantity of gasoline are now in active operation; and every increase in price is a stimulus to additional output.

Alternative Fuels, Alcohol and Kerosene

This brief review of market conditions shows that the problem of an adequate supply greatly overshadows the collateral problem of the increasing cost of gasoline. Fortunately we have two alternative liquid fuels immediately obtainable. Alcohol and kerosene oil offer an ample supply of satisfactory fuel to the power-driven vehicle. We need not discuss alcohol at this time, further than to point out that it is a very good fuel and can be used advantageously if gasoline advances to 20 or 25 cents wholesale. In fact, there is no valid reason why alcohol should not be used to-day in cars selling around $5000. Of course, special engines with appropriate compression are required, as gasoline engines are not adapted to alcohol. Predictions heretofore made in regard to denatured alcohol as a fuel have not yet materialized. Nevertheless, it is probable that alcohol alone could hold the price level of gasoline from advancing appreciably beyond 25 cents to 30 cents in tank car lots.

But the one best fuel is oil. Oil combines more advantages than any other. It is the fuel of the future as well as of to-day. In comparison with gasoline or alcohol it is much cheaper; safe; better adapted to shipment; more uniform in quality; more highly concentrated; more powerful; and above all more abundant in all localities. Even in the far-distant future when the crude oil output will have fallen below the world's demand for liquid fuel, a practically unlimited source of oil will be the great oil-bearing shales which cannot be worked profitably at the present low price of kerosene.

After many years of observation and experience I am convinced that as a medium for generating power for transportation on land or water, mineral oil or kerosene is the most valuable general-purpose fuel known to commerce. This statement is made in full recognition of the fact that the oil engine has always had less commercial popularity than either the gas or gasoline engine. In former days the oil engine was heavily handicapped by the high price of both crude and refined oil. Gasoline was then a by-product selling at 5 cents or even less. But time has completely reversed the market relations of gasoline and oil. Oil production is in excess of consumption. Kerosene is now the by-product and quoted at 60 per cent. less than gasoline.

Kerosene for Gasoline Engines

Of several hundred experimental or commercial oil engines made since the days of Brayton in 1876 nearly all were successful within certain limitations. The detracting feature in these engines is the lack of flexibility, which also characterizes the common kerosene lamp. It may be conceded that gasoline is by no means a flexible fuel in comparison with gas, but it is much superior to kerosene as heretofore used for illumination in lamps, or for power in combustion engines. There is no difficulty in operating a kerosene lamp properly adjusted to constant conditions. And there is not the slightest difficulty in using oil fuel in any ordinary gasoline automobile when fuel mixture, compression, temperature, atmospheric humidity, power output, engine speed, spark intensity and position, and fuel density are correct and absolutely constant. Under ordinary working conditions any ordinary engine with practically any good gasoline carbureter can use kerosene if kept at medium speeds.

A Maxwell car was thus taken from New York to Boston, operating entirely on kerosene except for starting. But the lack of adequate flexibility becomes increasingly apparent as the speed and power are reduced. If slowed down the car will not "pick up." One of the chief differences in the operation of stationary and automobile motors is that the former are generally governed on the hit-and-miss principle, whereas the latter are controlled by means of the throttle. Hit-and-miss governing is a great aid in the successful use of kerosene, because every charge taken in by the engine is a full charge and hence always equally proportioned and also compressed to the same pressure. Therefore, with a hit-and-miss governor it is only necessary to get carburetion right for one particular set of conditions. With throttle control the problem is much more complex. Nevertheless, the admitted crudity of hit-and-miss regulation precludes the necessity of serious discussion of it in connection with the modern oil engine.

Types of Oil Engines

Most of the oil engines which have reached the commercial stage may be classified under four general types. These typical engines include:

1—The Brayton—Constant flame type.
2—The Hornsby-Akroyd—Vaporizing type.
3—The Diesel—High compression type.
4—The Secor—Unitary control type.

The first of these, the Brayton, was exhibited at the Centennial Exhibition in Philadelphia in 1876. A salient feature of the engine was ignition by means of a constant flame within the combustion chamber. Brayton's objective was simply to produce an engine which could burn oil. Its performance was creditable for that early day. It was the predecessor of the Otto gas engine of 1878 and all gasoline engines. Even a better engine could not have achieved much success at that time, with oil selling around 20 cents to 25 cents per gallon.

The second of the typical oil engines, the Hornsby-Akroyd, had for its objective easy starting and simplicity of operation. It was very successful in both respects. Many previous oil engines, such as the Priestman, were sometimes exceedingly difficult to start and operate.

The third of the typical engines is the Diesel, in which the objective is thermal efficiency. The engine is an unqualified success in achieving the desired end. Its indicated efficiency is 48 per cent., which exceeds that of any other commercial heat engine of any type. This efficiency is partly offset, however, by an abnormally low mechanical efficiency of 70 to 72 per cent., which reduces the brake efficiency to a maximum of 35 per cent. when the engine is operating under the best conditions. It is about 17 years since the Diesel was first introduced.

The fourth typical oil engine, the Secor, embodies a fuel method which differs radically from that of other oil engines, in both principle and in operation.

Distinctions Between Oil and Gasoline

It is recognized that oil differs from gasoline in that it is:

1—Non-volatile.

2—Contains more B. t. u. per gallon and is heavier. (For example, 65-deg. gasoline weighs 6 lb. per gallon; kerosene, about 6¾ lb.; 37-deg. distillate, 7 lb., and 31-deg. crude, 7¼ lb.)

3—Oil is practically incombustible at ordinary temperatures.

4—Its range of combustible-mixture proportions is much narrower than that of gasoline.

5—The physical conditions for complete combustion are more exacting than in the case of the volatile liquid fuels or gases.

It resembles gasoline in that it is composed of complex chemical constituents with widely varying temperatures of vaporization. The fuel mixtures in a throttling-governed engine should vary in proportions in consonance with the variations in compression. "Constant mixtures" are detrimental in a gasoline engine and utterly impracticable in an oil engine.

A Multiple-Unit Governor for Oil Fuel

In view of the chemical complexity of oil fuel, and its lack of any fixed point of vaporization, and of the narrow range of working fuel mixture proportions, the only possible solution of the oil-engine problem is to concentrate the control of all functional operation under one multiple-unit

governor, which shall regulate simultaneously all independent agencies to suit the existing conditions. The multiple-unit governor regulates:

a—Fuel mixing proportions, supplying weaker mixtures for higher compressions and relatively stronger mixtures for low compressions and power output.

b—Quantity of fuel mixture. The quantity of fuel mixture is also controlled by the governor, which thereby determines compression, m.e.p., power output and r.p.m., as in gas engines.

c—Internal temperatures during compression, ignition and combustion are controlled by adding variable quantities of finely atomized water to the fuel mixture, the quantity of water being varied in proportion to the variation of temperature within the combustion chamber.

d—Ignition timing. In engines with variable speed the governor may advance or retard the point of ignition in consonance with variations in speed of engine. This is important in all cases where there is extreme variation in engine speed.

e—Speed control.

f—The use of gasoline for starting, the fuel supply being operatively connected so that as the engine speed accelerates in starting the gasoline supply is steadily lessened.

In view of what is claimed for the Secor-Higgins carbureter and what it has already accomplished, is it adapted for the power car and motor truck? I must say, frankly, that I do not know. We have had no time to take up experimental or research work along automobile lines. But we think it may be safely predicted that the time is at hand when gasoline will no longer be the sole fuel, or even the leading fuel for the automobile. We think it also safe to predict that the coming oil automobile engine will demonstrate the fact that one definite proportion of fuel to air does not give the best results under all circumstances, but that the ideal mixture must vary with every change in working conditions. Also, that the heated carbureter is a delusion and utterly impracticable. And finally, in view of the complexity of oil fuel and the changes in working conditions, that the principle of controlling all working factors in unison is an absolute necessity in a flexible automobile motor.

Remarkable Record in Shipping Sheet Piling to New Orleans

Unusually quick time was made both in the rolling and delivery of the emergency order for 500 tons of U. S. steel sheet piling taken by the Carnegie Steel Company last week for repairing the levees at New Orleans, so as to guard against flood breaks. The commissioners of the La Fourche district, who had arranged with the United States engineer corps for the immediate driving of the sheet piling with Government apparatus, asked that the steel reach New Orleans not later than April 17. This time was anticipated by three days, however, owing to the extraordinary efforts put forth by the makers of the steel and the railroads. The order was received at the general office of the Carnegie Steel Company Monday, April 7, at noon, and was sent by messenger to Homestead. The rolling, cutting into 20-ft. lengths and punching were finished Wednesday night, April 9. Railroad officials co-operated at every stage in the journey. Owing to the washouts on the Baltimore & Ohio regular route to Cincinnati a roundabout route had to be taken, lengthening the distance about 40 miles, and the movement of freight was slow at times because of soft track and other conditions resulting from the floods. The train reached Cincinnati at 2:45 a. m. Saturday, April 12. A delay of several hours followed, necessitating revision of part of the lading in order to avert danger while crossing the Ohio River. The train finally started for New Orleans at noon, Saturday, on a schedule of approximately 20 miles an hour, being accompanied by R. H. Tate, division freight agent of the Queen & Crescent at New Orleans. From Homestead to New Orleans the distance traveled was 1236 miles and the train arrived at New Orleans at 3.15 a. m. Monday, April 14. The order was thus received, executed and delivery made in less than one week, a remarkable performance in view of the adverse conditions.

Customs Decisions

Bag Making Machines

The Board of United States General Appraisers has decided that bagmaking machines imported by Thomas & Pierson, New York, are not machine tools within the meaning of the tariff act. The custom house assessment at 45 per cent. ad valorem under the metal schedule was affirmed.

Steel and Bronze Hinges

The board has overruled a protest by J. J. Gavin & Co., New York, relative to the classification under the tariff act of steel hinges with added fittings of bronze, silver-plated. The bronze material is in the shape of ornamental tops covering the socket and pivot portion of the hinge. The collector returned the goods at 45 per cent. ad valorem under paragraph 199, as "manufactures of metal." The importers claimed the merchandise dutiable at 1⅛ c. per lb. under paragraph 144, which levies that rate on "finished hinges or hinge blanks, whether of iron or steel." In overruling the importers' contention, the decision says in part:

> The provision in paragraph 144, as we read it, obviously applies to such hinges as are made entirely, or nearly so, of either iron or steel. These hinges are neither of iron nor of steel, but of steel and bronze. In the finished article the steel is not predominant, and for that reason we do not believe the article should find classification under paragraph 144. The bronze is not an immaterial part, as claimed by the protestants, but on the contrary it determines the very type and character of the finished article, besides forming by far the chief part of its total expense. As we regard the steel and bronze hinges here in question, they fail to respond to the requirements of paragraph 144, the steel not being the component material of chief value in the hinges. The hinges being entirely of metal, and in chief value of bronze, we think paragraph 199 should determine their classification.

Castings

The board has sustained, in part, a protest by William H. Masson, Baltimore, regarding the classification of castings. They were assessed for duty at the rate of 45 per cent. under the provision for "manufactures of metal." The importer claimed them dutiable under paragraph 147, at 8/10 of 1c. per lb. and 2/10 of 1c. per lb. Certain other castings were held to have been properly assessed. Some of the merchandise was claimed to be dutiable under the provision for forgings at 30 per cent. The collector's assessment, however, at 45 per cent. was affirmed.

Printing Presses

The board has sustained a protest by F. B. Vandegrift & Co. and the American Lithographic Company, regarding the classification under the tariff act of rotary printing presses used for printing pictures on paper from engraved copper rolls. Duty was assessed by the collector at New York at the rate of 45 per cent. under the provision in the law for manufactures of metal. The importers asked for a rate of 30 per cent. under paragraph 197, as printing presses. The testimony showed that the presses were not suitable for lithographic printing nor for printing from type. The style of press in controversy does not emboss but it applies the ink, the result being a printed picture or print known as intaglio printing. In reversing the collector, the board holds that the provision in the act for printing presses is not limited to such as print from type or from flat metal plates. It is broad enough to include the presses imported by the protestants.

Pantograph Machines

The United States Court of Customs Appeals has affirmed the Board of General Appraisers in the case of Johnson & Co., involving the classification of pantograph machines used to trace designs on rollers to be used in calico printing. They were returned for duty by the collector at 45 per cent. under paragraph 199, as "manufactures of metal." The importers appealed to the board with the claim that the articles were "machine tools" within the meaning of the law. The board found against the contention and the appellate tribunal now affirms the conclusion reached by the lower court of customs.

Recovery From the Flood

The Portsmouth Steel Company, Portsmouth, Ohio, advises us that the property loss in that city was small. All manufacturing plants resumed operations in full last week. The Portsmouth Steel Company is now running its mills as usual and can handle the orders on its books as well as additional specifications.

James K. Cullen, vice president of the Niles-Bement-Pond Company, is chairman of the relief committee at Hamilton, Ohio, and has been actively at work day and night, the situation in that city taxing every local resource, while outside help was sought and promptly given. At the plant of Mr. Cullen's company and at other plants in Hamilton the losses were heavy, but in every case the most energetic efforts are being put forth to get into full operation.

The New Albany Mfg. Company, New Albany, Ind., which produces stone-working machinery, has resumed operations after a shutdown because of the flood. Prospects for continued full operation are good.

Cincinnati Interruptions Not Serious

The American Tool Works Company's plant, being well above the flood line, its business was not interrupted except for the absence of a number of employees who were detained by the flood. The closing down of the foundries on which the company depends has not hampered it, as it usually carries two or three months' stock of castings.

The Lodge & Shipley Machine Tool Company was inconvenienced only indirectly by the flood in its manufacturing. To provide transportation for some of its employees living beyond the flooded district it constructed and operated three skiffs. Some shipments were made by the company, even at the height of the flood, by hauling lathes to the Kentucky side of the river.

The Cincinnati Milling Machine Company had no interference with its manufacturing operations, its plant and the street car lines to Oakley as well as the homes of the employees being above high water. The company has been steadily in operation with full day and night forces. The chief inconvenience encountered was in delays of mails over a period of a week. The railroads have been accepting shipments since April 8.

After being inconvenienced for some days, being already behind on orders, the Champion Tool Works Company is now running full time.

The Joseph Joseph & Brother Company was a heavy loser by the floods. Back water from Mill Creek covered its office floors to a depth of 3 ft., and in addition its cotton waste mill was partly inundated. Its scrap-storage yards were also flooded. As soon as the water subsided a large force was put to work cleaning up and the company is now in position to make as prompt shipments as ever.

Although at one time 12 ft. of water ran through the foundry of the Bollman-Wilson Foundry Company, Cincinnati, it was able to clean up, dry out its molding sand and take off three heats last week.

The Loss to Columbus Industries

The Columbus, Ohio, flood was confined to the territory west of the Scioto River and interfered with only one of the city's four manufacturing districts. At the plant of the Hayden-Corbett Chain Company one of the buildings collapsed. Operations have now been resumed, however. The Sun Mfg. Company, manufacturer of show cases, porch swings, etc., lost a considerable amount of lumber and its woodworking machinery was more or less damaged by the water. The American Cash Register Company, manufacturer of cash registers, sustained a loss of about $20,000. The Columbus Machine & Tool Company was also damaged to the extent of about $20,000. The Columbus Hoe & Tool Company and the Columbus Buggy Company lost some lumber and were damaged from the water. The Standard Chain Company's works were under water for two or three days. The Ohio Tool Company also sustained a considerable loss.

There was no damage to the Columbus Iron & Steel Company, the Jeffrey Mfg. Company, the Kilbourne & Jacobs Mfg. Company, the Ohio Malleable Company and the Kinnear Mfg. Company. The Franklin furnace of the Carnegie Steel Company required to be dug out, the water having risen high enough to go in at the tuyeres. Many county bridges about Columbus have disappeared and three large bridges in the city across the Scioto were carried away, but none of the railroad bridges was lost. About 300 houses, mostly of the smaller type, were destroyed, while nearly 3000 suffered some damage. There is rapid recovery in the western district of the city, interrupted transportation being now the chief drawback.

An Important Freight Rate Decision

WASHINGTON, April 15.—The Interstate Commerce Commission on Monday approved certain increases in the freight rates on pig iron from the Michigan upper peninsula and other points to Kansas City and Omaha, the increases to become effective June 1. This decision is considered important, as it is believed to forecast the decisions of the commission in other cases affecting pig iron, ore, etc., pending before it and which will be decided this spring. Included in these are the Sloss-Sheffield case, the Pittsburgh Steel Company case, the Youngstown Sheet & Tube Company case and several others.

The commission approves a rate of $3.58 a ton on pig iron from Duluth, Ashland, Chocolay, Manistique, Newberry and other northern points to Kansas City. The present rate is $3.08 and the carriers sought to increase it to $4.16 a ton. From the same points to Omaha the commission approves a rate of $3.08 per ton. The present rate is $2.50 and the carriers sought to increase it to $3.58.

When the carriers filed the tariffs showing a general readjustment of rates on pig iron from points in Minnesota, Wisconsin and the northern peninsula of Michigan to a territory of distribution in which Kansas City and Omaha are the most important markets, the commission, on complaint of the Lake Superior Iron & Chemical Company which has plants manufacturing pig iron at Ashland, Manistique, Chocolay, Newberry, and other places on the northern peninsula, suspended the proposed readjustment. The company protested against the increase in the rates and asked that the present relation of rates be not disturbed on the ground that it made its investments on the basis of the present relation, and it contended in substance for the continuance in the territory in question of the present competition of its own furnaces with the furnaces at Chicago. In this case, among other things the commission said that it cannot be controlled by or base its action upon a contract between a carrier or a shipper respecting rates, and continuing added:

"The public interest in a rate or schedule of rates can not be governed by any such private agreement or by any such matters of estoppel. We can not enforce such contracts or give them any substantial consideration. We can not give permanency either to a rate or to a relation of rates simply because, with or without a previous agreement with the carrier, a large manufacturing plant has been erected when that particular rate or relation of rates was in effect. It is no less clear that we cannot ignore geographical and similar conditions merely because one point has been competing commercially with another, under a favorable rate adjustment, voluntarily established by the carrier, and require the continuance of the rate relation when not otherwise justified as a rate proposition. In all cases under the mandate of a statute the rate must be reasonable and non-discriminatory, when viewed in the light of all the conditions that surround the traffic. We cannot base our action on any other grounds." W. L. C.

The American Shop Equipment Company, Chicago, Ill., has recently issued a catalogue showing several of its standard types of furnaces. These are so designed that either gas or oil can be used as fuel, and in making the change from one to the other very little difficulty is encountered. One of the special features of the line is a system of panel design by which the sizes can be varied easily. In addition to the furnaces, the auxiliary equipment required in a modern shop in connection with furnace plants is illustrated and briefly described. A discussion of the equipment and methods employed in the heat treatment of steel by James H. Herron is included in the catalogue.

Patent Law Rulings and the Sherman Act

Views on Pending Legislation in the Light of the Dick Case Decision

A paper on "The Present Condition of the Patent Law" is scheduled for discussion at the coming meeting of the American Society of Mechanical Engineers at Baltimore, May 20 to 23. The paper, which is printed in full in the April Journal of the society, is an analysis of recent decisions of the Supreme Court of the United States and of proposed patent legislation, and has been submitted by Edwin J. Prindle, of Prindle & Wright, patent lawyers, New York City. From this contribution has been taken the subjoined discussion to the effect that the Dick mimeograph case decision is not in conflict with the Sherman anti-trust act, and also some of Mr. Prindle's views regarding proposed legislation.

It will be recalled that the Supreme Court in the Dick case sustained the right of the patentee to require the purchaser of the Dick machine to buy the ink and paper for use on the machine from the patentee. The author's remarks in this regard are as follows:

Difference Between the Patent and Sherman Acts

The patent act was for the purpose of inducing inventors to make inventions and to put the public in possession of a working knowledge of them, and the sole inducement was a monopoly granted to the patentee for a limited time to make money out of the invention, if he could. On the other hand, the Sherman act was for the preservation of the rights of the public in trade which it already possessed and to prevent raising by a monopoly the prices of articles in which the public already had a right to trade. The patent statute was for the purpose of bringing into existence trade in articles which never had and perhaps never would have existed but for the monopoly offered by the public as a reward to the inventor for inventing them, while the Sherman act was to preserve to the public free competition in trade which already existed and belonged to the public.

The patentee takes no rights from the public when he restricts the conditions of use or price of sale of patented inventions. He is but dealing with his own. He can suppress it if he wishes. The public can have it without price simply by waiting until the patent has expired, but the patentee has a contract (his patent) giving him the exclusive right until that time. The public never had any right to sell ink for use with Dick's machine, for the machine never existed until he invented it. Therefore, he has taken nothing away from the public which belongs to it, and there is nothing for the Sherman act to operate upon.

The control of the patentee over the conditions of use or sale of his patented article is not so absolute as it might seem. The only way in which he can get return from his patented article is by inducing the public to use it. If, then, he imposes restrictions which are too burdensome or which take away the advantage of the public in using the article, he cuts down the sales which he might otherwise make. This fact alone puts a limit on the restrictions which the patentee will impose on his patented article.

Justification of the Bath Tub Decision

The patent involved in the bath tub decision, Mr. Prindle explains, was one relating to an implement for shaking sand, more or less automatically, on a red hot iron bath tub for the purpose of forming an enamel on the bath tub. Under the guise of licensing manufacturers under the patent to use the implement, a combination of manufacturers was effected, which prescribed prices and conditions under which bath tubs were to be sold. The association forbade the selling of "seconds" or bath tubs which were in any manner imperfect, and not only fixed the prices, but imposed penalties for selling below those prices. The association also provided a jobber's license agreement which he had to execute before he could purchase the licensed sanitary enamelware. Various zones were established which were to be preserved to specified parties. There were other regulations too numerous to mention.

The Supreme Court in the bath tub case held, in effect, that the manufacturers had formed a combination in restraint of trade and in violation of the Sherman act, and that the patent was a mere cloak. The vital objection was that the manufacturers formed a combination among themselves. The court did not decide that the patentee could not have lawfully imposed the same conditions separately upon each manufacturer as a license if there was no combination and conspiracy between the manufacturers. If the manufacturers had all had their relations directly with the patentee and there had been no combination among themselves, so far as the Supreme Court decided, it would not have been objectionable. The court did not decide whether or not it was lawful to regulate the price of unpatented bath tubs under a patent for a patented implement used in the manufacture of the bath tubs.

Objections to Proposed Patent Legislation

Of the proposed legislation, Mr. Prindle gives chief attention to the bill recommended by a majority of the patent committee of the House of Representatives. One of the provisions of this is that compulsory licenses are obtainable from a Federal district court by any one who can establish that the owner of the patent has purchased the patent for the purpose of suppression. The author contends that no manufacturer would dare to patent or disclose anything but the preferred form of the invention, because inferior forms which he might patent and disclose could be manufactured by others, under the compulsory license, in competition with the preferred form. The manufacturer could not afford to improve his product, because the moment he began to manufacture the improved form, somebody would demand the right to manufacture the poorer, original form. No manufacturer could afford to own more than one patent in a given line. The constant danger of litigation to compel a license would make patents much less desirable property than they are today, and greatly decrease their value.

Patents have not cost the public a single penny, for the inventors have, by their fees, paid all the cost to the government of granting them. On the other hand, the price paid by inventors in the cost of experiments, and in the time involved and the energy expended, has been beyond all calculation.

The patent law needs changes, but changes to build it up, not to tear it down. The patent office should have a sufficient force of adequately paid examiners so that it can make practically certain it is issuing patents only for inventions which are new. The procedure of adjudicating a patent should be made cheaper, simpler and shorter. For that purpose there should be enough judges so that patent cases may be quickly tried by testimony taken orally in the presence of the judge, instead of by printed records of testimony taken slowly and expensively before a master and then read before a judge. The fees now payable to the clerks of the courts should be reduced to only a fair compensation for the services performed. And a single court of patent appeals should be established, instead of the present intolerable system of nine separate circuit courts of appeals, each having equal and independent jurisdiction in their own circuits of every patent.

Collective Bargaining in Massachusetts

"Collective Agreements Between Employers and Labor Organizations" is the title of Part 3 of the Forty-second Annual Report of the Statistics of Labor, issued by the Massachusetts Bureau of Statistics. The volume contains 318 pages. There is a general discussion of collective agreements in the introduction, and following it are details of national and district systems of collective bargaining in the United States. It is explained that the Bureau does not attempt to compile information relative to collective agreements outside of Massachusetts except in so far as certain representative agreements negotiated by national or international unions may be operative within that State, or illustrate forms of agreement to which attention may well be directed. The agreements with the International Molders' Union of North America and with the metal polishers come up for consideration among others. Considerable space is given to local agreements between employers and local organizations in Massachusetts. In an appendix notes are given relative to collective agreements in foreign countries as compiled from reports of foreign labor bureaus.

A Quick Method for Converting Temperature Figures

The inconvenience of the computation for converting Centigrade to Fahrenheit degrees or vice versa is a matter of common experience and usually there is a resort to pencil and paper. Carl Hering, Philadelphia, has recently made public a simple and easily remembered approximate rule for mentally making these calculations, doing away with the troublesome factor 5/9. It gives accurate results in converting Centigrade into Fahrenheit, but there is a slight error with the opposite conversion..

To convert Centigrade to Fahrenheit: Double the Centigrade temperature and deduct one-tenth of that figure (or deduct 10 per cent, then double it) and add 32. Thus, 1000 deg. C. doubled is 2000; less a tenth (200) leaves 1800 deg. F.; adding 32 gives 1832.

To convert Fahrenheit to Centigrade: Halve the Fahrenheit temperature and add one-tenth of that figure (or add 10 per cent., then halve it). Thus, 2000 deg. F. halved is 1000; plus one-tenth (100) gives 1100 deg. C. Accurately it is 1093.3 + deg.; hence the approximate value is only about ½ of 1 per cent too high. Again, 3000 deg. F. halved is 1500, plus a tenth (150) gives 1650 deg. C. Accurately it is 1648.9 —; hence the approximate value is less than one-tenth of 1 per cent too high. For the lower temperature this rule is not applicable, for the error increases as one descends the scale. It is merely a quick approximate rule for mental calculation of the higher temperatures at which metallurgical processes are usually carried on.

The mathematical proofs of these rules are very simple as the correct factors are 5/9 and its reciprocal, besides the 32.

Kennicott Company Receives John Scott Medal

The Kennicott Company, Chicago Heights, Ill., has been awarded the John Scott legacy medal for its water weigher or measurer. The award was made by the city of Philadelphia, on the recommendation of the Franklin Institute, in consideration of its novelty, simplicity of design and accuracy in water measuring.

This device is designed to give a record of the weight of boiler feed water evaporated in a power plant or wherever a record of the amount of water used is required. The weigher consists of a shell, the lower portion of which is divided into two measuring or weighing compartments and a plain open siphon in each discharges the water when the full unit charge has been received. A tipping box composed of two halves which alternately fill with water serves the double purpose of furnishing a sufficient quantity of water to start the siphons and to shift the supply from one compartment to the other. The tipping box is balanced on knife edges directly above the weighing compartment and is operated by floats, one in each.

In operation, the water enters the inlet and passes through the tipping box where a small portion is intercepted, the remainder flowing directly to the weighing or measuring compartment below. When this compartment is nearly filled, the float tilts the tipping box, thus automatically discharging the water contained in the tipping box into the compartment and completing the unit charge and starting the siphon. A counter registers each double unit charge delivered by the weigher.

Electric Smelting of Iron Ore in Sweden.—The completion of two electric furnaces for the smelting of iron ore is reported from Sweden, at the Hagsfors Iron Works, and both are in operation. The capacity of each is 3500 electric hp. The construction of a third furnace has been undertaken. The Stora Kopparbergs Bergslags Aktiebolag has also started two large electric furnaces with capacities of 6000 and 12000 hp. respectively, with a third one under construction.

The N. O. Nelson Mfg. Company, St. Louis, reports that it has acquired the plant of the Union Sanitary Mfg. Company, Noblesville, Ind., with an annual output of about $500,000 of plumbing wares. This makes four factories controlled by the Nelson Company, the other three being located at Edwardsville, Ill.; St. Louis, Mo., and Birmingham, Ala., the last named being a cast-iron soil pipe plant.

Experience with Steel Molds for Ingots

In the Völkingen Works, in Germany, of which Fr. Amende is the manager, they were having the usual trouble with iron ingot molds, so that in 1910 they experimented with steel molds. Up to that time their iron molds lasted for only about 100 ingots. In describing his experience in Stahl und Eisen, March 20, Mr. Amende says: "That the ingot mold cost per ton of steel plays a very important rôle is well known. If one succeeds in increasing their durability two, three or even four fold he should be able to convert the most pessimistic." The author claims that his steel ingot molds largely did away with the defects of the iron molds, such as longitudinal and horizontal cracks and gradual burning out. The form of the mold does not change in service and has the same appearance after 700 casts as at first. The Rombacher Hüttenwerke were the first to make steel molds in Germany and used open-hearth steel. Mr. Amende uses basic Bessemer steel with good results, preferring a medium hard quality.

From the experience of the author water-cooling is prohibited; the molds must be brought gradually to the desired temperature. This is accomplished by subjecting them to a blast of compressed air as they stand on cars. The steel molds are lighter than the corresponding iron molds, but do not differ in shape. There was no distortion such as is reported from some sources. The principal kinds of molds lasted for 4000 kilograms of ingots. There were some failures until the present method of procedure was developed. The author tried various kinds of steel, such as low carbon, rail and others, but returned in each case to the medium hard variety. At his plant they were using 161 steel molds of various sizes. The largest number of ingots cast in any one mold is 704. There are molds lasting anywhere from 587 ingots down to one, but in most cases there were easily explainable causes for the failures.

Mr. Amende is convinced that steel ingot molds have a great future. He considers that in his plant they have lasted extraordinarily well. But care in their treatment must be exercised; and as an instance a mold is cited that had been used to produce 700 ingots. Its appearance was as good as new, but the next morning it was cracked wide open. An investigation showed that it had been "barbarously treated" with water by the night shift.

Lackawanna Steel Company's Earnings

The income account of the Lackawanna Steel Company and subsidiary companies for the quarter ended March 31, 1913, is as follows, compared with the corresponding quarter in 1912:

	1913	1912
Income after deducting all expenses, including ordinary repairs and maintenance of plants and interest on bonds and fixed charges of subsidiary companies	$1,386,028	$112,439
Other income	217,516	199,964
Total income	$1,603,544	$312,404
Interest on Lackawanna Steel bonds	437,478	437,495
Sinking funds and exhaustion of mines	107,668	89,500
Depreciation and renewals	315,877	236,180
Total deductions	$861,024	$763,176
Profit	742,520	*$450,772
Profit on sale of assets of subsidiary companies	267,200	.....
Total profit	$1,009,721	*$450,772

*Deficit.

Unfilled orders March 31, 1913, were 623,816 gross tons, against 626,996 tons December 31, 1912, and 401,475 tons March 31, 1911.

The Public Service Commission of the State of New York has rendered a decision in the case of the city of Buffalo against the Cataract Power & Conduit Company and the Buffalo General Electric Company, distributers of electric power in that city, directing that certain reductions be made in existing rate schedules. For the Cataract Power & Conduit Company the reduction ordered for large consumers of electric power and light is 33.2 per cent; for general power, 32.7 per cent; for residence lighting, 28 per cent; for street arc lighting, 10 per cent. This reduction does not apply to current sold to the International Railway Company. For the Buffalo General Electric Company the reduction ordered is an average of 25 per cent for power and lighting to general consumers.

February Iron and Steel Exports and Imports

The February report of the Bureau of Foreign and Domestic Commerce shows a decrease in both our iron and steel exports and imports as compared with the figures for January. The total value of the exports in February of iron and steel and manufactures thereof, not including iron ore, was $24,085,871, against $25,141,409 in January. The value of similar imports in February was $2,581,379, against $2,860,510 in January. This decrease in the case of the exports is due to the fact that February was a short month, the daily average value of the exports in February being $860,210, against $811,103 in January. The daily average of imports, however, was slightly less, the figures for the two months being $92,192 for February and $92,275 for January.

The February exports of commodities for which quantities are given total 241,880 gross tons, against 249,523 tons in January, this apparent falling off also being due to the shorter month. Details of the exports of such commodities for February and the eight months of the current fiscal year ended with February are as follows, compared with the corresponding periods of the previous fiscal year:

Exports of Iron and Steel

	February		Eight months	
	1913	1912	1913	1912
Pig iron	27,882	18,785	194,309	81,116
Scrap	9,721	9,912	70,675	50,192
Bar iron	1,126	647	17,840	9,664
Wire rods	3,497	3,778	43,725	21,204
Steel bars	19,264	12,418	159,740	82,870
Billets, ingots and blooms, n. e. s.	13,035	15,423	190,954	126,628
*Bolts and nuts	1,569	—	13,339	—
Hoops and bands	1,192	515	11,281	4,825
*Horseshoes	121	—	740	—
Cut nails	223	448	3,641	7,146
§Railroad spikes	885	—	8,607	—
Wire nails	3,816	11,830	38,825	39,396
All other nails, including tacks	334	1,336	2,729	8,395
Pipes and pipe fittings	19,980	18,187	161,101	132,657
Radiators and cast-iron house heating boilers	1,019	271	5,940	2,977
Steel rails	53,376	29,262	309,991	245,701
§Galvanized iron sheets and plates	9,079	19,960	88,735	112,253
§All other iron sheets and plates	1,648		22,103	
§Steel plates	18,114	18,742	173,355	164,064
§Steel sheets	9,374		85,138	
Structural iron and steel	27,692	21,485	214,090	154,247
Tin and terne plates	4,284	4,928	45,351	44,808
Barbed wire	5,629	7,798	60,517	71,416
All other wire	9,080	9,288	90,361	84,205
Totals	241,880	205,013	2,013,087	1,443,764

*Included in "all other manufactures of iron and steel" prior to July 1, 1912.
§Not separately stated prior to July 1, 1912.

The January imports of commodities for which quantities are given total 24,903 gross tons, against 21,739 tons in January. Details of the imports of such commodities for February and for the eight months of the current fiscal year ended with February, compared with the corresponding periods of the previous fiscal year, are as follows:

Imports of Iron and Steel

	February		Eight months	
	1913	1912	1913	1912
Pig iron	12,816	5,553	97,898	78,083
Scrap	6,020	1,039	24,897	7,781
Bar iron	2,570	1,522	19,070	16,111
Structural iron and steel	667	97	3,951	2,045
Billets, bars and steel plates, n.e.s.	1,245	1,513	12,549	16,109
Steel rails	199	479	2,454	2,293
Sheets and plates	280	139	2,492	1,615
Tin and terne plates	274	224	1,589	2,456
Wire rods	832	1,057	9,883	9,482
Totals	24,903	11,623	174,783	135,975

The February imports of iron ore were 188,734 gross tons, against 175,463 tons in January and 129,693 tons in February, 1912. The total quantity of iron ore imported in the eight months of the fiscal year ended with February was 1,474,397 gross tons, against 1,293,675 tons in the corresponding period of the previous fiscal year.

The total value of the exports of iron and steel and manufactures thereof, excluding ore, in the eight months of the current fiscal year ended with February was $198,310,227, against $158,566,701 in the corresponding period of the previous fiscal year. The total value of similar imports was $21,286,806 and $17,359,076, respectively.

The wire mill of the Standard (Southern) Steel Company at Gadsden, Ala., is now in full operation.

The Central Foundry Company's Year

The annual report of the Central Foundry Company for the calendar year ended December 31, 1912, showed largely increased business as compared with the previous year. Net earnings amounted to $174,325, as compared with $63,344 for the eight months from April 22 to December 31, 1911. The reports of the subsidiary companies make the following showing: Central Foundry Company, gross business for 1912, $3,010,459, compared with $1,142,538 for the eight months in 1911; net profits $188,423, compared with $124,888 in 1911; surplus as of December 31, 1912, $313,312. Central Coal & Iron Company reported deficit of $34,296, compared with deficit of $58,836 in 1911, which places total deficit as of December 31, 1912, at $336,366. Central Radiator Company showed profits in 1912 amounting to $20,198, compared with a deficit of $2708 in 1911. This reduces the total deficit of the company to $90,681.

In his remarks to stockholders, President Waddill Catchings says, in part: "The excellent showing made by the Central Foundry Company was done entirely by the old plants of the company. The new plant at Holt, Ala., was put in operation December 3, 1912, and is now turning out products in such volume as to assure a handsome return. In addition to the 42 retort ovens now working, 20 new ovens are being constructed, it having been found that the ovens on hand were not sufficient to handle the business. During the year the railroad to the company's valuable ore property at Friedman was completed and the Holt furnace will benefit by the rich and cheap ore from the Friedman district. The net profits of the Central Radiator Company, compared with a deficit in 1911, were largely due to the fact that the company made very few sales in the early part of the year when prices were low. Later on prices advanced to high figures and the accumulated stock was disposed of at high prices."

Yale & Towne's New Building

The Yale & Towne Mfg. Company announces the removal of its general offices from 9 Murray street to 9 East Fortieth street, New York, on April 18, 1913, where all correspondence should thereafter be addressed. This new location was selected after long and thorough investigation, as the one best suited to meet the convenience of the company's customers, and to promote the efficiency of its management. It is in the center of the up-town section of the city, midway between the two great railroad terminals, in the heart of the hotel district, and easily accessible from all parts of the city.

The site comprises a plot 50 x 100 ft., occupied by a 12-story building, erected and owned by the company, and carefully designed to meet its requirements. The entire ground floor is devoted to a series of exhibit rooms, which when completed (about July 1), will comprise the largest and most effective display of locks and builders' hardware that has ever been made, and which are designed to serve the convenience of architects and their clients and of trade customers generally. In the basement, well lighted, is located the city salesroom, for the convenience of local trade customers, a large stock room, and the repair department. The twelfth floor is devoted to the executive offices and the directors' room. On the floors below the twelfth are located the offices of the department managers and treasurer, and the large clerical force required for the conduct of the business. Three of the lower floors will be rented to other parties for the present, and until required for the company's own use.

A Zinc Smelter in the Pittsburgh District

The American Metal Company, Ltd., New York, which is the largest producer of zinc in the United States, with plants located in Oklahoma and Kansas, has purchased 2500 acres of Pittsburgh vein coal and 350 acres of surface land at Burgettstown, Pa., and will immediately begin the erection of a zinc smelter and sulphuric acid plant. A subsidiary company, known as the American Zinc & Chemical Company, is being organized, with a Pennsylvania charter, to operate the new plant. N. L. Heinz, formerly connected with the Matthiessen & Hegeler Zinc Company, La Salle, Ill., and one of the best-known metallurgical

acid experts in the country, has been elected general manager and a member of the board of directors.

What is known as a one-unit plant will now be erected, which will have a capacity for producing 40,000 tons of sulphuric acid and 20,000 tons of zinc annually. The plant will be so designed that it can be rapidly enlarged, and it is the intention to build additional units until the annual capacity amounts to three or four times the original production. A shaft will be sunk and coal mining operations will be commenced coincident with the opening of the plant. The initial investment in this new plant will be not less than $2,000,000, and it is expected that when the entire plant is completed and in full operation, which will probably be within three years, it will represent an investment of approximately $5,000,000. To properly provide for the employees and their families the company will build a model town, which will be laid out along the lines of the most approved plans for town development. A landscape gardener has already been engaged who will have complete charge of this work. First-class cottages of brick and frame construction will be erected.

The Burgettstown location was selected only after a careful and exhaustive investigation by Mr. Heinz and Dr. Otto Sussman, chief mining engineer of the American Metal Company, Ltd., extending over a period of eight months. Test holes were drilled on the property to ascertain the extent and quality of the coal and it is estimated that enough coal underlies the property to take care of the company's requirements for at least 75 years. The site was brought to the attention of the company by R. W. Cooke, industrial agent of the Pennsylvania Lines West of Pittsburgh.

The Machinery Markets

No exceptional activity is reported from any of the machinery distributing centers, but conditions are of a hopeful character as a rule and in some cities improvement has been felt. The extent to which business has been disturbed by the Western floods is daily becoming more apparent and the machine tool industry in some localities has suffered severely. Some of the New York dealers have had a fairly good amount of business and see more in prospect. The Philadelphia trade is giving especial attention to the requirements of the Pennsylvania Railroad, which is of large proportions. Other inquiries are rather light. Detroit has had a quiet week locally, although some business has been gained in scattered orders from outside territory. Inquiry is more active and sales have improved in Chicago, but business is only of normal volume. Cincinnati reports that despite the disastrous floods which interrupted trade the machine tool business is better than it was at the corresponding time a month ago. In the Central South, where the high waters also interrupted trade, the general conditions are good and renewed activity is looked for. Demand has continued unimpaired in the Birmingham district. A fair business with indications for greater activity are found in St. Louis. In Texas there is an improvement in the demand from New Mexico and Arizona for mining equipment. Small orders are still the rule on the Pacific coast, but the demand is comparatively active. The salmon fisheries and fruit canning interests are beginning to prepare for a heavy season, while logging and sawmill equipment is moving.

New York

NEW YORK, April 16, 1913.

Local conditions in the machinery trade continue somewhat irregular, although a slight improvement is noted. The best feature of the situation is the number of prospects. Inquiries have continued to come from the Pennsylvania Railroad, and these requirements constitute the most encouraging indication of greater activity in the not far distant future. Another list before the trade is one from the Norfolk & Western Railway, which is in reality a revision of one announced several months ago. One of the changes is the substitution of machines with motor drive in place of some first specified with belt drive. The General Electric Company has been putting out some inquiries and done some buying of machine tools in the last few days. As a rule the orders being booked are not of large size and come from scattered sources. In the last week or two milling machines have been in good demand in this territory. At least two dealers have experienced a little falling off in the last week, but they believe that the month's total will reach good figures. The dealers have, as a rule, enjoyed a fairly steady run of trade of late and probably would be more active at present were it not for the floods in the West, which have made deliveries from shops in the affected territory difficult, if possible at all. As an instance of the trouble, the Hamilton Machine Tool Company, Hamilton, Ohio, under date of April 4, sent a circular letter to its patrons asking their indulgence if deliveries were delayed. It was pointed out that while the shops of the company were not inundated, many others were, and that the railroads had suffered so severely that freight could not be received or shipped. Of course, there has been betterment since the letter was written, but the railroads are still in bad condition and the movement of freight slow and uncertain. In some cases mail between New York and the Middle West required as much as ten days in transit.

Following close upon the great sale of the machinery of the E. R. Thomas Motor Car Company is that of the entire plant and equipment of the Chandler Planer Company, Ayer, Mass., to take place April 24. It will be sold at auction by J. E. Conant & Co., Lowell, Mass., who conducted the Thomas sale at Buffalo. The sale will include 40,808 ft. of land, buildings, power plant, patents, drawings, patterns and all other appurtenances, and a large number of standard and special machine tools, electric motors and general equipment to be found in a well designed plant for the manufacture of machinery. The sale starts upon the premises at 10:30 a. m.

An addition 50 x 150 ft., one story, is to be made to the plant of the Fabrikoid Works at Newburgh, N. Y., owned by the DuPont de Nemours Company, of Wilmington, Del. Other additions to the plant will be made later.

The Charles A. Lamos Company, Peekskill, N. Y., has been incorporated with a capital stock of $50,000 to manufacture sash, cornices, columns, etc., and will establish a plant for the purpose. Charles A. Lamos, Jr., T. Nelson, Jr., and J. Towart, Jr., Peekskill, are the incorporators.

The Board of Trustees, Pleasantville, N. Y., W. H. Dominick, president, is receiving bids for furnishing and installing a pump, motor valves and other material for improving the village waterworks system.

George W. Braunsdorf, Inc., Highland, Ulster County, N. Y., has been incorporated with a capital stock of $25,000 to manufacture felts, felt specialties and piano supplies. George W. and H. P. Braunsdorf and A. M. Junge, Brooklyn, are the incorporators.

The Delaware & Hudson Railroad Company has purchased land adjoining its shops at Oneonta, N. Y., and will erect several shop buildings, including a coach shop. George H. Burgess, Albany, is chief engineer.

The Board of Village Trustees, Honeoye Falls, N. Y., is receiving bids until April 24 for the construction of a municipal waterworks system, including pumping station and elevated water tank; also about 5½ miles of pipe line. Plans are by Engineers White and Getman, Mutual Life Building, Buffalo.

The Corning Light & Power Company, Corning, N. Y., has been incorporated with a capital stock of $500,000 to manufacture and supply electric light and power. D. J. Creem, C. L. Rossiter and J. McNamee, Brooklyn, N. Y., are the incorporators. A new power plant will be built at Tioga avenue and Chestnut street.

The Elmira Water, Light & Railroad Company, H. M. Beardsley, manager, Elmira, N. Y., is having plans prepared for the construction of a new power station.

Bids are being received by the Board of Contract and Supply, Schenectady, N. Y., for necessary apparatus for

the equipment of the garbage disposal plant to be built by the city.

The Board of Public Works, Albany, Wallace Greenalch, commissioner, has had plans prepared for a sewage disposal plant.

The Rochester Glass Works, Rochester, N. Y., will add two one-story buildings 50 x 205 ft. and 40 x 200 ft., respectively, to the present plant on Maple street, that city.

The Atlas Steel Casting Company, Buffalo, N. Y., will make extensive additions to its plant at Elmwood avenue and the Erie Railroad. Three large buildings will be erected which will double the company's capacity for basic open-hearth steel castings.

The Hewitt Rubber Company, Buffalo, has completed plans for a three-story factory addition 90 x 460 ft., of reinforced concrete, to be erected at its plant at Kensington avenue and the New York Central Railroad belt line. Considerable machinery and equipment will be installed.

The Erie Car Works, Erie, Pa., has begun the construction of a building 100 x 400 ft., one story, to its plant.

The Edison Electric Company, Erie, Pa., will build a two-story addition 100 x 100 ft. to its power plant.

The Ivey Motor Truck Company, Inc., Buffalo, has been incorporated with $10,000 capital stock to manufacture and deal in motor trucks, engines, etc. The incorporators are A. L. Rusling, 9 Walden avenue; A. Ivey, 12 Tremont avenue, and Frank S. Heller, all of Buffalo.

New England

BOSTON, MASS., April 15, 1913.

The announcement of the proposed tariff bill has had little effect, that is to say the direct result is no greater than that of the previous discounting of the probable situation. The labor situation is generally regarded as the more vital issue, but in New England conditions are propitious enough. In Hopedale the I. W. W. strike at the Draper Company's works is fraught with the usual amount of violent measures on the part of the foreign-speaking employees and the trouble has extended to the town of Milford, where the moulders of the Milford foundry are out and other strikes are expected. But the condition is local. Several small foundry strikes in other centers have been settled amicably before serious loss was incurred. Sympathy among workmen generally is strongly against the methods pursued by the I. W. W.

The General Electric Company is planning to expend over $1,000,000 in improvements at Pittsfield, Mass., in the next two years, according to the announcement made to the city authorities in connection with a petition for certain rights to build spur tracks. If the petition is granted options to large areas of land will be consumated. Within a year two buildings will be erected, one 100 x 470 ft. and 45 ft, the other 60 x 840 ft. and four stories. The plans also include a building 100 x 900 ft., four stories.

The National Company has been incorporated at Waterbury, Conn., to manufacture iron and brass specialties. The incorporators are M. J. Byrne, F. C. Smith and Arthur A. Tanner, all of Waterbury.

The Southbridge Optical Tool Company, Southbridge, Mass., which will move its shops to Providence, R. I., has incorporated under a Rhode Island charter, as the Optical Tool Company, with an authorized capital of $100,000. John McMullen is the president; E. R. Durgin, vice-president; R. H. Simonds, treasurer and general manager, and W. H. Siddall, secretary. The company has taken 5000 sq. ft. of space in the Enterprise building.

The Economic Machine Company, Worcester, Mass., manufacturer of labelling machinery, has purchased the Lombard buildings, which it occupies in part, and will make radical improvements that it may increase its manufacturing capacity, taking full possession for its purposes of the entire property.

The plant of the Bay State Stamping Company, Worcester, Mass., was seriously damaged by fire, April 14, the estimated loss being about $30,000. The company manufactures metal stampings.

The Hendee Mfg. Company, Springfield, Mass., manufacturer of motor cycles, has purchased a tract of land on State street, upon which will be erected extensions of two existing buildings, a length of 112 ft. The enlargements will include the brazing department, frame room, sheet metal, grinding and gear cutting rooms; the departments for manufacturing iron and aluminum parts, and the department for the final assembling and testing of machines and motors. These enlargements are of the present plant. The new works now under process of construction have been described in this column.

The Winchester Repeating Arms Company, New Haven, Conn., will erect a new 5-story building, 53 x 103 ft., with an ell 25 x 45 ft.

The New Britain Machine Company, New Britain, Conn., will erect a factory building 36 x 258 ft., 5 stories, and a one-story blacksmith shop 50 x 92 ft.

The Holyoke Valve & Hydrant Company, Holyoke, Mass., will build a four-story factory on land just purchased on Race street.

W. A. Hardy & Sons, Fitchburg, Mass., manufacturer of composition castings and railroad and paper mill specialties, will extend its plant.

Additions to general manufacturing facilities in New England include the following: Stamford Gas & Electric Company, Stamford, Conn., addition of a story to a building 60 x 150 ft.; Earnsdale Worsted Company, Clinton, Mass., additional story to mill; W. H. Ballou, Worcester, Mass., addition 22 x 30 ft.; Stamford Chemical Company, Stamford, Vt., replacing plant recently destroyed by fire; J. T. Robertson Company, Norwich, Conn., factory 52 x 130 ft., three stories; Darling Woolen Mills, Milford, Mass., 40 ft. addition; Clinton Wire Cloth Company, Clinton, Mass., storehouse.

Philadelphia

PHILADELPHIA, PA., April 15, 1913.

The trade has been pretty well occupied in preparing figures against the recent inquiries of the Pennsylvania Railroad, which are said to represent an aggregate of nearly $500,000. Under the circumstances current business has not been followed as sharply as usual, with the result of a falling off in orders. New tool inquiry has been less active and has been confined to small lots. Few groups of tools of any importance have developed. There is almost an entire absence of inquiry for electric traveling cranes. Machinery builders report a fair amount of business in scattered orders. The second-hand machine tool trade is inclined to be quiet. General power equipment has not been in very good demand, although some fair business is in sight. Steel casting plants are pretty well supplied with orders for the remainder of the first half of the year, but little second half business has developed.

The St. Lawrence Pulp & Lumber Corporation, of which R. F. Whitmer, of William Whitmer & Sons, lumber merchants, Franklin National Bank Building, is president, expects to break ground for large pulp mills in the vicinity of Cambleton, Province of Quebec, Canada, in the near future. The company has large lumber concessions in Canada, and it expects to definitely decide on the location of the mill and make a selection of an engineer for its erection in the immediate future.

The Western Maryland Dairy, Baltimore, Md., has plans under consideration for the erection of a model dairy plant at 111, 113 and 115 Linden avenue, that city. Tentative plans provide for a building 150 x 150 ft., equipped with modern dairy appliances.

The Bureau of Building Inspection, Philadelphia, has approved plans by Zantringer, Borie & Medary, architects, for a 37-story office building to be erected at the northwest corner of Broad and Locust streets. Preliminary estimates on the cost of construction are now being taken.

Irwin & Leighton, builders, have been awarded the contract for the erection of the buildings for the new plant of the Tin Decorating Company, Boston and Patuxent streets, Baltimore, Md. Plans are by Theodore Wells Pietsch, engineer, Baltimore, Md. Considerable piling work will be required, the contract for which has been awarded to Sanford & Brooks. The power plant equipment will be placed by the engineer.

Estimates are being received by Ballinger & Perrot, engineers, for a one and two-story factory building, to be erected for A. Edward Newton, as an addition to the plant of the Walker Electric Company, at Twenty-fourth and Callowhill streets. The proposed building will be 176 x 200 ft. and will be equipped with a steam heating plant, elevators, etc.

The Philadelphia Rapid Transit Company is having plans prepared for a one and two-story combination office building, car barn and repair shop, to be erected at Fifty-eighth and Vine streets. The company expects to take bids for the construction of the building at an early date.

It is reported that a contract has been placed by the Independent Ice Mfg. Company, Camden, N. J., for the erection of a brick, concrete and steel ice manufacturing plant, comprising a one-story building 90 x 279 ft. and a two-story building 90 x 140 ft.

The William Steele & Sons Company has begun operations on a five-story addition 65 x 150 ft. to the mill of C. H. Masland & Sons, Amber and Willard streets, previously reported.

The United Roofing & Mfg. Company, Morris Building, is taking estimates for a one and two-story addition, 120 x 323 ft., to its plant at Marcus Hook, Pa. A steam heating plant is to be installed.

Baltimore city water engineers have prepared plans for a $1,750,000 water filtration plant, which the city proposes to erect at Lake Montebello. The plans have been submitted to the Board of Awards and reported approved. The plant is to have a capacity of filtering 132,000,000 gal. of water a day. Contracts for a portion of the work are expected to be placed early in the summer.

It is reported that the Landis Machine Company, Waynesboro, Pa., is planning to erect a new shop building 80 x 200 ft. Particulars are not available.

The Downingtown Iron Works, Downingtown, Pa., recently incorporated, will, it is stated, manufacture a line of iron and steel boilers, stacks and tanks, dredge pipe, etc. L. C. Zimmerman is president and general manager.

Chicago

CHICAGO, ILL., April 15, 1913.

Following a few weeks in which the machinery trade in the territory about Chicago experienced a slight lull, sales of the past week show a pleasing improvement. This increase in business is perhaps not so well distributed as at other times, in as much as the major portion of two large railroad lists—one the Boston & Maine and the other the Wabash—were taken by one interest. Inquiry from manufacturers in general has been more active and miscellaneous sales show a normal aggregate. In Chicago alone building permits covering the erection of new factory buildings include a one-story brick factory 50 x 116 ft. for L. H. Bronson at 629 South Forty-fifth court; a one-story factory 50 x 125 ft. for the Guyton-Cunfer Company at 4451 Filmore street; a one-story factory 92 x 115 ft. for William Landschaff at 2900 Darwin terrace; a one-story shop 78 x 148 ft. for the Cribben & Sexton Company at 727 North Albany avenue; a one-story factory 62 x 87 ft. for A. A. Kamin at 4015 Hirsch street; a one-story factory 40 x 85 ft. for A. & C. Albamonezc at 3079 Ashland avenue; a two-story factory at 2124 West Forty-ninth street for R. F. Conway & Co.

The William Morris & Sons Company, West Thirty-fifth street, Chicago, manufacturer of sash and doors, suffered a loss to its plant, approximated at $100,000, as a result of fire.

The White Brothers Sheet Metal Company, Chicago, has been incorporated with a capital stock of $50,000 to engage in a sheet metal working business. The incorporators are Halbert E., Harry K. and Harvey A. White.

Lambert & Mann, 216 South Jefferson street, Chicago, will require new equipment for the machine shop being erected for them at Wood and Walnut streets. The new shop is to be 100 x 112 ft.

The Graver Tank Works, East Chicago, Ind., has completed an addition to its shop 66 x 190 ft., in which addition new cranes and fabricating machinery are to be installed.

The North Chicago Foundry Company, North Chicago, Ill., whose incorporation was recently noted, has secured a building site on which a main factory building 64 x 210 ft. and a fireproof pattern vault 30 x 50 ft. will be erected.

The Redin & Ekstrom Company, Rockford, Ill., has plans in preparation providing for the adding of a second story to its present machine shop, thus doubling the capacity.

The McAleenan Boiler Company, Peoria, Ill., has leased a portion of its shop to the Baird Brothers Company, of Champaign. The lessees will engage in the building of patented agricultural machinery, for which suitable equipment is to be installed.

Cleveland

CLEVELAND, OHIO, April 15, 1913.

The Winton Gas Engine & Mfg. Company, Cleveland, which recently built a plant for the manufacture of marine gas engines, has purchased nine acres adjoining its present site with a view to greatly increasing the capacity of its plant. The erection of new buildings may be deferred until next year.

The Troike Muffler & Mfg. Company, Lorain, Ohio, is the name of a new company that has been incorporated with a capital stock of $20,000 for the purpose of manufacturing gas and gasoline engines, mufflers and muffler accessories. The company will build a plant adjoining that of the Hoffman Heater Company on Washington avenue. The incorporators are Ernest Troike, George W. Deehr, A. H. Babcock and others.

The Massillon Bridge Structure Company, Massillon, Ohio, has increased its capital stock from $250,000 to $450,000.

Frank A. Brandes, who is well known to the machinery trade of northern Ohio, has opened an office at 715 Marion Building, Cleveland, where he will deal in machine tools and accessories under the name of the Brandes Machinery Company.

The Carrollton Novelty Company, Carrollton, Ohio, has recently equipped a modern foundry and will do a general jobbing work in connection with the turning out of its various lines of products.

The Paramount Brass Mfg. Company, Cleveland, has been incorporated with a capital stock of $10,000 by William M. Behn, W. F. Grimmell and others.

The Means Engineering & Foundry Company, Toronto, Ohio, has changed its name to the Henderson Foundry & Machine Company. New officers have been elected as follows: President, E. L. Henderson; vice-president, Thomas Price; treasurer, R. W. Henderson; secretary and general manager, Charles E. Wells. This company has taken over the sewer pipe equipment business of James O. Goodlin, Son & Company of Toronto.

The Morgan & Marshall Co-operative Rubber & Tire Company, recently organized at East Liverpool, Ohio, is planning the erection of a two-story plant 60 x 150 ft.

The Ashtabula Metal Stamping Company, Ashtabula, Ohio, has ben incorporated with a capital stock of $10,000 by J. M. Van Tassel, A. M. Biedler and others.

The Thew Automatic Shovel Company, Lorain, Ohio, will enlarge its plant by the erection of an addition 51 x 195 ft. to its forge shop and an addition 73 x 83 ft. to its machine shop.

Cincinnati

CINCINNATI, OHIO, April 15, 1913.

Several of the railroads are yet in a crippled condition, and both inbound and outbound freight to many points is subject to delay. The mail service is now better, and before the end of the week there will probably be no delays. Every machine tool plant in Cincinnati is now in operation; common labor is scarce, as the railroads have drawn heavily on the local supply for repair work, but skilled labor is about the same as usual.

In spite of the flood handicap a few machine tool builders report business much better now than at this time last month. The improvement is about equally divided between local and domestic customers.

A few of the local foundries that were flooded have resumed operations, but others will require probably 10 days more to get their plants into shape.

It is reported that the Illinois Leather Company, Chicago, now operating a small plant in this city, is having plans prepared for a large factory to be erected on McLean avenue. Building details are not yet available.

The Jeannette Light & Water Company, Anawalt, W. Va., has been incorporated with $10,000 capital stock and will build a small light and water plant. R. L. Johnson is one of the principal incorporators.

On account of the recent flood damage sustained by the city waterworks at Ironton, Ohio, it is now believed that a new pumping station will have to be constructed. If this is correct considerable new pumping machinery will be required.

The Kelsey Hardwood Lumber Company, North Tonawanda, N. Y., has acquired a large site in Carthage, a Cincinnati suburb, which will be used for lumber storage purposes. A planing mill will also be installed at a later date.

The Ideal Concrete Machinery Company, South Bend, Ind., has leased a large building on Colerain avenue and will soon move its headquarters to this city. The South Bend plant will continue to be operated. Special machinery will be required, but no list is now available.

The Kroger Grocery & Baking Company, Cincinnati, will build a large garage on Florence avenue, in connection with which a small repair shop will be operated.

The Hanna Paint Company, Columbus, Ohio, has had plans prepared for the erection of a six-story factory building 70 x 120 ft. and of brick construction.

The Home Steam Avondale Laundry Company, Cincinnati, will erect a large plant on Reading road, the es-

timated cost of which will be $65,000. Practically all equipment has been contracted for.

S. M. Long & Son, Shelbyville, Ky., have opened a large repair shop and factory supply house at that point.

It is reported that the Cambria Clay Products Company, Ironton, Ohio, is figuring on erecting a large brick plant near Ironton.

The Snider Mfg. Company, Logan, Ohio, is buying considerable woodworking machinery for a new furniture factory just completed.

Wheeling

WHEELING, W. VA., April 15, 1913.

The Royal Glenn Land & Lumber Company, Petersburg, W. Va., has been incorporated with a capital stock of $100,000 to manufacture lumber, grind grain, build and operate tanneries, operate electric power and light plants and deal in timber and mineral lands. The incorporators are James C. Watson, F. M. Reynolds, of Keyser, W. Va.; W. H. Loy, Cisna Run, Pa.; L. J. Forman and P. Hendrickson, of Petersburg, W. Va.

J. M. and J. B. Crawford have purchased the interests of F. J. Bradford in the Parkersburg Rig & Reel Company at Parkersburg, W. Va., and have effected a new organization by taking into the company three employees—F. J. Bradford, Western representative of the company at Tulsa, Okla.; F. F. Rudy, superintendent, and L. D. Dunsmore, bookkeeper. Plans are being prepared for a new plant, which will contain four buildings, namely, 32 x 125 ft., 20 x 125 ft., 40 x 125 ft. and 50 x 150 ft. respectively. The firm will continue under the old name. A large number of machine tools will be needed.

The power plant of the Franklin Coal Company at Stewartsville, 10 miles west of Bellaire, Ohio, was completely destroyed by fire with a loss of $18,000.

The Hughes River Gasoline Company, Parkersburg, has been incorporated with $5,000 capital stock for the purpose of manufacturing gasoline. Henry and Martin H. Goodkind, of New York; G. L. and C. B. Watson, of Parkersburg, are the incorporators.

The Perryville Coal & Mining Company, Malden, W. Va., has been incorporated with $50,000 capital stock. The incorporators are Dr. J. W. Bealor, Thomas H. Paul, Mary Catherine Bealor, Ruth V. Paul, of Shamokin, Pa., and G. A. Bealor, of Charleston, W. Va.

The Elkins Tanning Company, Elkins, W. Va., one of the principal leather companies in the United States, will double the size of its plant.

Ballantyne Bros., Bert Brown, W. Arnold and others, of New Cumberland, W. Va., have taken over the Standard Brick Company, of that place, and are having plans prepared for building a factory at a cost of $40,000 to replace the one destroyed by fire and flood in 1907. The plant will have a capacity of 40,000 brick a day.

The Citizens' Lumber Company, Parkersburg, W. Va., has purchased a site 50 x 400 ft. for the erection of a large plant. Lewis Dudley is president of the company.

Detroit

DETROIT, MICH., April 15, 1913.

The strictly local market has been rather quiet the past week and no new business of importance has come out. Merchants state that there is nothing to indicate a resumption of activity in the immediate future, and the outlook is not as promising as might be desired. The automobile trade continues to be the source of scattered orders for one or two machines. The upstate market has been proportionately more active, particularly in the line of woodworking machinery, and a sale of a round lot of tools to a Muskegon manufacturer is noted. There also exists some demand for saw mill supplies. Little business is moving the second hand machinery market. A slightly better demand in power equipment is reported, the smaller units especially being purchased in larger volume. Increased activity is noted among gray iron foundry plants. Building operations are increasing in volume, but the structures on which figures are being asked are in the main not of a class which is directly interesting to the trade.

The Chambray Carburetor Company, Detroit, has been incorporated with $50,000 capital stock to manufacture carburetors and other automobile accessories. The incorporators are John H. Chambers, James W. Mowbray and Charles H. Bennett.

The Studebaker Corporation, Detroit, automobile manufacturer, will enlarge its No. 1 plant on Piquette avenue by the erection of a large brick addition.

The Gearless Differential Company, Detroit, has increased its capital stock from $20,000 to $50,000.

The Germain Mfg. Company, Saginaw, Mich., has been incorporated with a capital stock of $75,000 to manufacture piano parts. The new company has acquired a large factory site and will at once begin the erection of its plant. The main building will be 110 x 310 ft. with a separate power plant and dry kilns. Louis Germain, E. F. Germain and W. M. Germain are the incorporators.

The Kalamazoo Cushion Spring Horseshoe Company, Kalamazoo, Mich., has been incorporated with $10,000 capital stock to manufacture horseshoes. John McDermott is general manager of the new company.

The Ovid Furniture & Mfg. Company, Ovid, Mich., has been incorporated with $100,000 capital stock to manufacture furniture and veneering. The new company has acquired a factory which will be put in operation as soon as possible. S. I. Fox, G. D. Mason, G. R. Brandt and Robert Hyslop are among the directors.

The Hastings Wool Boot Company, Hastings, Mich., is preparing to install a new boiler plant of increased capacity and will also remodel and enlarge other portions of its factory. Between $20,000 and $30,000 will be spent on the improvements.

The Lake Independence Lumber Company, Big Bay, Mich., is preparing to establish a chemical plant to utilize the by-products of its saw mill. The plant will be equipped for the manufacture of wood alcohol, acetate of lime, etc.

The Michigan Wheel Company, Grand Rapids, Mich., is reported to be planning the extension of its machine shop on property recently acquired adjoining its present plant.

Marshall Smith, Flint, Mich., will establish a veneer and basket factory at Clio, Mich.

The Stimpson Scale & Electric Company, Northville, Mich., manufacturer of computing scales, has increased its capital stock from $50,000 to $100,000.

The plant of the Trojan Laundry Company, Detroit, was destroyed by fire April 9, entailing a loss of $100,000. Steps will be taken immediately for the resumption of operations.

The Turner Construction Company, 11 Broadway, New York, has been awarded the general contract by the American Agricultural Chemical Company for a new factory building at its Detroit works. This building will be 40 x 150 ft., three stories, of reinforced concrete throughout. A. H. Nickerson is engineer and architect.

Indianapolis

INDIANAPOLIS, IND., April 15, 1913.

The Indiana Electric Company, Traction-Terminal Building, recently incorporated, will build a factory and warehouse at 1022 East Michigan street. It has taken over from the Indianapolis Brass Company more than 1000 devices, relating to electric railway equipment, assuming the patents, contracts and unfilled orders of the brass company. The latter will continue in the jobbing brass trade and making of aluminum castings. James H. Drew, who was one of the organizers of the brass company, is general manager of the new company.

The American Creosoting Company is having plans made for a plant at Indianapolis, to cost about $500,000. The company has purchased a site of thirty-six acres at Sherman Drive and the New York Central Lines, and has taken options on fourteen acres adjoining. In addition to the buildings there will be storage yards, with six miles of switch tracks. Ward H. Watson, Indianapolis, is one of the directors of the company. A. T. Hert, Louisville, Ky., formerly superintendent of the Indiana Reformatory at Jeffersonville, Ind., is president of the company.

The Swartz Electric Company, Indianapolis, has been incorporated with $150,000 capital stock, to manufacture electric lighting plants, storage batteries, lamps, etc. The directors are Ira T. and S. M. Swartz and Virgil H. Lockwood.

The George C. Clark Metal Last Company, Mishawaka, Ind., has been incorporated with $50,000 capital stock, to manufacture metal boot and shoe lasts. The directors are George C. Clark, Harry W. Clark and William H. Holland.

The National Pin & Bracket Company, North Vernon, Ind., has been incorporated with $10,000 capital stock, to manufacture insulator pins, brackets, etc. The directors are J. E. Owen, H. L. McNaughton and E. Eberts.

S. H. Murphy & Co., Straughn, Ind., have been incorporated with $10,000 capital stock, to manufacture

cement products. The directors are Samuel H. Murphy, Luther F. Symons and Hawley Hall.

The Heim Cement Products Company, North Liberty, Ind., has been incorporated with $10,000 capital stock, to manufacture cement products. The directors are E. W. Heim, J. B. Fair and W. L. Wilson.

The Service Electric Company, Evansville, Ind., has been incorporated with $40,000 capital stock, to manufacture and deal in electrical supplies. The directors are Harry A. Robertson, Ray C. Straight, Merritt W. Smoth.

The Evansville Railways Company, Evansville, Ind., has increased its capital stock from $1,000,000 to $2,000,000.

Milwaukee

MILWAUKEE, WIS., April 14, 1913.

Since the tariff bill was made public a week ago, Milwaukee machinery manufacturers have found some relief from the strain and anxiety which impending legislation fixed upon their minds months ago. The proposed tariff does not find favor in any quarter, but the principal worry is concerning its probable effect on the general business situation in the nation. It is generally admitted that the Central Western industries will not be nearly so harshly affected as those in the East and this eases the situation somewhat. The shops have plenty of work to do and orders are being booked at a satisfactory rate, although the effects of the Ohio floods were apparent. How long this satisfactory condition will continue is problematical, but the optimists are increasing in numbers. The Allis-Chalmers interest has given assurance of a continuance of policies evolved during the receivership, and no changes that would tend to ruffle the surface are in prospect. About 1200 more men are employed than at the time the receivership began a year ago.

The contract for constructing a sewer and sewage disposal system for the west district of Fond du Lac, Wis., has been awarded to the E. G. Harding Company, Racine, Wis., at $63,358.30. The machinery contract is sub-let to the Yeomans Bros. Company, Chicago. W. S. Shields, Chicago, Ill., is consulting engineer.

The Falls Machine Company, Sheboygan Falls, Wis., manufacturer of automobile motors and general gasoline and gas engines, is building an addition which will greatly increase the capacity. The building is 140 ft. long and two stories, of steel and brick.

The Menominee Motor Truck Company, Menominee, Mich., formerly the D. F. Poyer Company, has purchased a site of 12 acres adjoining its works and proposes to make substantial extensions this year. The company builds light delivery cars and will go into the heavy duty truck field as soon as the facilities are enlarged sufficiently. D. F. Poyer is president and general manager.

In line with modern policy, the J. I. Case Threshing Machine Company, Racine, Wis., is establishing a hospital for its 2000 employees. A surgeon and a trained nurse will be in constant attendance. The company is building a structure opposite its general office building on Mead street for the purpose.

E. M. Parmelee, D. D. Rowland and W. B. Lucas, of Sheboygan, Wis., have organized the American Gas Engineering Company with a capital stock of $50,000, to engage in engine manufacture. Plans have not assumed definite shape.

The Standard Bedding Company, Milwaukee, has had plans prepared for a five-story factory, 60 x 120 ft., to cost $50,000. It will be located on Chicago street.

A committee of creditors has taken charge of the Stowell Mfg. & Foundry Company, South Milwaukee, Wis., and the works are being operated as a going concern under the direction of Frederick L. Sivyer, president of the Northwestern Malleable Iron Company and of the Sivyer Steel Casting Company, Milwaukee, appointed trustee, with a view of disposing of the property to satisfy the claims of creditors. It is stated that the assets are $250,000 and the liabilities approximate $175,000. The company was founded in 1888 by John M. Stowell, of Milwaukee, to manufacture malleable iron castings, link chain and hardware specialties.

The Sailer-Whitmore Company, Neenah, Wis., is operating with a slightly reduced force as the result of a strike of about 40 molders and ironworkers.

Tenders for furnishing and erecting complete a 12,000,000-gal. pumping engine in north point pumping station of the Milwaukee municipal waterworks system will be called for within the next two weeks by F. G. Simmons, commissioner of public works. Joseph A. Mesiroff is city engineer.

The Central South

LOUISVILLE, KY., April 15, 1913.

The Ohio River is again at a practically normal stage, but machinery business is still suffering from the effects of the recent flood. Many plants which were partially submerged are now getting their machinery in shape to continue. While postal service is again being offered without interruption, freight traffic is still in bad shape, the congestion in the Indiana and Ohio flood-stricken territory having resulted in a shortage of cars which is affecting conditions in the South, where flood and storm did relatively little damage. A leading local manufacturer of machinery reported that seven carloads of equipment to be shipped South were being held up on account of the inability of the railroads to furnish the rolling stock. While trade has been interrupted by the flood, general conditions are believed still to be good, and machinery men are looking forward to renewed activity as soon as natural factors become favorable.

The Henry Vogt Machine Company, Louisville, has sold a 30-ton ice machine to William Leahy for installation at Sullivan, Ind.

Brinton B. Davis, Inter-Southern Building, Louisville, will let a contract this week for the nine-story reinforced concrete warehouse of the Standard Sanitary Mfg. Company in Louisville and will then be ready to proceed with placing orders for the equipment, which will be elaborate.

The Louisville Tin & Stove Company is considering the enlargement of its plant on Maple street to take care of a decided increase in business. Details will be ready in about 30 days.

The Clark Motor Car Company, Louisville, will need additional equipment for the repair shop of its new garage at 206 East Broadway. F. S. Clark is president of the company.

Joshua Oldham & Sons, New York, saw manufacturers, have appointed Lewis Doster, secretary of the Hardwood Manufacturers' Association, their general sales representative in this territory, with headquarters in Cincinnati. Mr. Doster of course has resigned the association connection.

The B. H. Alvey Company, Louisville, has been incorporated with $100,000 capital stock for the manufacture of rotary steam engines and other machinery. Theodore Leisen, chief engineer of the Louisville Water Company, is one of the incorporators. B. H. Alvey and John M. Alvey, Elizabethtown, Ky., are the chief stockholders.

The steel department of the American Car & Foundry Company's plant in Jeffersonville, Ind., across the river from Louisville, has a lot of work on hand, an order for 40 steel passenger coaches from the Pennsylvania Lines having been turned over to that plant for manufacture.

R. L. Moore & Co., Marion, Ky., have been incorporated with $10,000 capital stock for the purpose of operating a flour mill.

The National Motor & Supply Company, Cairo, Ill., has sold a gasoline engine to the LaCenter, Ky., Advance.

Evans & Son, carriage manufacturers of Guthrie, Ky., suffered $15,000 loss by fire which destroyed their plant recently. They intend to rebuild.

The Board of Public Works of Madisonville, Ky., will receive bids April 30 on the erection and equipment of a waterworks plant, exclusive of the tower and tank, which have already been contracted for. The equipment to be purchased includes boilers, engine, pumps, mains, etc. The cost will be about $65,000. C. H. Jenks, Union City, Tenn., is the engineer in charge.

Short & Kain, Maysville, Ky., will enlarge their woodworking and blacksmith shop, which was recently damaged by flood. Part of the shop will be rebuilt and additional machinery installed.

The American Metallic Packing Company, which, as recently reported, is enlarging its plant, is in the market for a hoisting engine, engine lathe and other machine tools.

The Martin's Fork Coal Mining Company, Harlan, Ky., is in the market for a boiler and engine to operate the shaker of the mine, as well as a drum wheel, wire rope, etc.

The Columbus Creamery Company, Columbus, Ind., has decided to rebuild its plant, which was destroyed by flood recently. It will be larger than the old one, and equipped with power machinery, conveyors and other up-to-date dairy devices.

The May Hosiery Company, Nashville, Tenn., which is to establish a branch at Lawrenceburg, Tenn., will let the contract for the power and special machinery shortly, as work on the mill building has been begun.

The Reuther-Scanlon Handle Company, Nashville, Tenn., is establishing a woodworking factory of considerable size. W. C. Kelley, Thomas Scanlon and R. L. Reuther are the officers. The plant is located at Fourteenth avenue.

Caldwell Bros., Columbia, Tenn., are in the market for a 40-hp. boiler. Used equipment is desired.

Memphis, Tenn., is considering the issuance of $500,000 of bonds for the improvement of the water system. Of this amount $150,000 is for increasing the pumping capacity of the plant and miscellaneous construction, and $185,000 for extensions of mains. Address the city commissioners.

W. F. Cummins and Thomas Cotton, Mount Pleasant, Tenn., are in the market for power and special machinery for a steam laundry which is to be established at once.

The Vestal Lumber & Mfg. Company, Knoxville, Tenn., has purchased a Sinker-Davis band mill and is installing one of the most modern lumber plants in the state.

T. O. Watkins, formerly with the Watkins Machine & Foundry Company, Hattiesburg, Miss., has become general manager of the Howze Lumber Company, McLain, Miss., and is in charge of plant extensions which are to be made.

F. Johnson, Gibsland, La., who operates a woodworking plant, will erect a large sawmill near that city, according to recent reports. Equipment is to be purchased at once.

The Young Aeroplane Company, Kansas City, Mo., is planning the location of a branch factory at Paducah, Ky., or some other point in the Ohio Valley.

E. R. King, Memphis, Tenn., is organizing the King Reclining Swing Company and will establish a plant for the manufacture of wooden swings. He was formerly superintendent of the woodworking department of the American Car & Foundry Company's plant near Memphis. He is president of the concern, Dr. I. N. Frost, vice-president, and W. C. Enos, secretary. Machinery is now being purchased.

Power and special equipment will probably be purchased by F. G. Ewing at Glenraven, near Adams, Tenn., to take the place of the sawmill which was destroyed by fire April 2 with a loss of about $5,000.

The Crystal Springs Bleachery Company, Chickamauga, Ga., has begun the construction of its new plant, which will cost from $100,000 to $125,000. It will have 20,000 spindles and 7,000 looms. Power machinery, as well as textile equipment, will be purchased at once.

The North Carolina College of Agriculture and Mechanic Arts, West Raleigh, N. C., is planning to build new forge, foundry, wood and machine shops, the buildings to occupy 25,000 sq. ft. of floor space. The equipment from its present shops will be used in the new buildings and literature on equipment and building construction is desired with a view to further purchases.

The Jefferson County Asphalt Company, Louisville, is considering a considerable enlargement of its plant. Owen Tegart may be addressed.

A new power plant will probably be installed at the Norton furnace, owned by Norton Iron Works, Inc., Ashland, Ky., a decision to purchase a new engine having been arrived at. Other improvements are to be made.

Polk Bros., Taylorsville, Ky., have disposed of their tobacco factory to James H. Marcus, M. I. Wakefield and others, Shelbyville, Ky. The plant is to be removed to Shelbyville and its capacity considerably enlarged.

The Eubanks Canning Company, Eubanks, Garrard County, Ky., is being organized and will erect a plant.

The Appalachia Machine Works, Appalachia, Va., is in the market for a 5-hp. gasoline engine, transmission equipment, drill press, lathe and other machine tools. R. H. Masters is manager.

Attention has been called by machinery men to the fact that eastern Kentucky coal mines, in order to enable themselves to supply the demand for steam coal, which at many seasons cannot be produced in sufficient quantities by means of screenings from the domestic grades, are installing crushing machinery. This promises to become a considerable item in the near future.

The Evansville Brewing Association, Evansville, Ind., has secured permission for the construction of a switch into its plant from the line of the Illinois Central Railroad and will spend $200,000 in the erection of a modern bottling plant.

S. M. Brogan has purchased a brick plant at Lewisburg, Tenn., and will enlarge it in the immediate future.

It is reported that the city of Macon, Ga., will grant a franchise to W. Jordan Massee and associates to build a $500,000 gas plant.

The J. B. McCrary Company, Atlanta, Ga., is preparing plans for an electric lighting system at Girard, Ala.

Birmingham

BIRMINGHAM, ALA., April 14, 1913.

There has been practically no suspension of factory or industrial operations by flood, and, as a result, the spring trade in machinery and machine tools has suffered no setback, but continues good. It is somewhat less in volume than in the early days of March, but is satisfactory. Gasoline engines are in principal demand.

The Blount Mountain Coal, Lime & Cement Company, Philadelphia, Pa., announces its purpose of constructing at Village Springs, near Birmingham, Ala., a $750,000 cement plant with a capacity of 1500 barrels of Portland cement, a $100,000 plant for the manufacture of hydrated lime and a $50,000 plant with a daily capacity of 1000 tons of fluxed stone, all buildings to be of steel and concrete. Officials have just gone over the site of 3595 acres owned by the company. J. C. McGinnis, president of the First National Bank, Frackville, Pa., is president and general manager, C. A. Snyder vice-president, Alfred V. Weaver secretary, P. J. Costello treasurer. Richard K. Meade, of Baltimore, Md., is engineer. The capital stock of the company is $2,000,000.

The J. K. Orr Shoe Company, Atlanta, Ga., is considering the establishment of an additional shoe factory.

Robert Rainey, Petersburg, Va., and James Watt, W. P. Upchurch and others, of Thomasville, Ga., have applied for charter for a company to establish a trunk factory at Thomasville, Ga.

The city of Aliceville, Ala., will shortly offer $10,000 of bonds for construction of a waterworks system.

The Black Mountain Coal Land Corporation, Bristol, Va.-Tenn., has awarded a contract to the Montgomery Coal Washing Company, Birmingham, Ala., for a coal washing plant, etc., at the mines at Pockett, Ala.

B. F. Harwood, of the White Coal Company, Uniontown, Ala., will establish a feed and grain mill, operating with a gasoline engine.

George H. Lowe and others have incorporated the Universal Ice Company, Birmingham, Ala., with a capital stock of $1,000,000. It proposes to build and operate small ice plants in various Alabama towns.

T. J. Scully and T. J. Savarese have organized a company with a capital stock of $100,000 at Tampa, Fla., for the establishment of an ice plant with an initial capacity of 50 tons.

The city of Savannah, Ga., will establish an incinerator with a capacity of 130 tons minimum. Richard Davant, mayor.

Hawthorne Mfg. Company, Hawthorne, Ga., will establish electric lighting plant. It will also build a veneer plant.

Panama City, Fla., will vote at an early date on bonds for the installation of an electric lighting plant. T. Calvin Stevens is mayor.

The Rock Creek Lumber Company, Hampton Springs, Fla., has been incorporated with a capital stock of $50,000 by J. B. Clark, D. O. Henry and John F. Harrell, all of Live Oak, Fla. Same parties have incorporated the Ecofena Lumber Company, Perry, Fla., and will engage in timber cutting and sawmill operation.

The Little River Power Company, Fort Payne, Ala., is having surveys made at Little Falls preparatory to building a dam for developing hydroelectric current for various cities in North Alabama.

E. M. Henson and J. J. Parrish, Jr., of the Southern Food Products Company, have submitted a proposition to citizens of Hawkinsville, Ga., for the establishment of a plant. Stock is being subscribed for.

The Hawthorne Ice Mfg. Company, Hawthorne, Fla., will add a cold storage plant.

A. G. Sylvester, of Wauchula, Fla., and associates, of Palmetto, Fla., have organized a company with a capital stock of $25,000 for the manufacture of crates. Plant to be located at Palmetto.

William K. Sloan, Swedesboro, N. J., is asking for a franchise to operate a $35,000 gas plant at Thomasville, Ga.

Ice and electric lighting plants will be established at Jacksonville, Fla., by the Pable Pier Investment Company, which has just been incorporated with a

capital stock of $100,000. Marcus Conant is president and A. Dean secretary and treasurer.

St. Louis

ST. LOUIS, Mo., April 14, 1912.

The machine tool market continues to show a fair business, with some encouraging indication from the inquiries which are coming in in increasing numbers, though there have been no large new lists. The chief recent event was the award of the Wabash contract for equipment for its new shops. This was pretty well distributed, though probably the Niles-Bement-Pond portion of the award was a little larger than that of any of the rest. Collections are reported fair and business is not regarded as being unduly influenced by the extra Congressional session.

The Specialty Cabinet & Fixture Company, St. Louis, has been incorporated by Herbert L. Spradling, of Webster Groves; James H. Sentenne, of Kirkwood, and William A. Joos, of St. Louis, to equip a plant for the manufacture of all kinds of cabinet woodwork.

A heating plant to cost about $30,000 is to be built at Trenton, Mo., by the Rock Island Railroad in conjunction with the new power plant, round house and shop under construction there.

The Mississippi Valley Blau Gas Company, St. Louis, recently noted as incorporated, has acquired a tract at the north end of St. Louis and is having plans prepared for a plant to cost about $500,000 fully equipped. It is to be completed in nine months. H. F. Farwell is vice-president and general manager.

The Consumers' Ice & Fuel Company, Jerseyville, Ill., with $100,000 capital stock, has been incorporated by Roy A. Nutt, Edward K. Leary and N. S. Brett to operate an existing plant and also to make extensive improvements.

The St. Louis Popcorn Machine Company, with $100,000 capital stock, has been incorporated by Wesley A. Kaiser, W. F. Ramsey, H. A. Pesold, J. C. Taylor and others to equip for the manufacture of patented vending machines.

The Curtis & Co. Mfg. Company, of St. Louis, has increased its capital stock from $500,000 to $750,000 for the purpose of extending its manufacturing and other operations in the production and distribution of heavy machinery.

The Dundas Mining Company, Joplin, Mo., with $30,000 capital stock, has been incorporated by D. M. Sogers, W. F. Mohr and George D. Sogers to equip and operate mining property controlled by them.

The Pump & Tank Company, St. Louis, has increased its capital stock from $3,000 to $100,000 for the purpose of entering extensively into the manufacture of pumps, tanks, etc.

The Vegeglue Company, St. Louis, with $20,000 capital stock, has been incorporated by P. T. Bolz, George A. Bang, Leo Bierling, Frank Schmit and others to equip a plant for the manufacture of a vegetable glue.

The St. Louis Southern Railroad Supply Company, St. Louis, has increased its capital stock from $25,000 to $65,000 for the purpose of extending its manufacturing capacity.

The Warren Light & Power Company, Warren, Ill., with $25,000 capital stock, has been incorporated by A. J. Johnson, G. W. Scheidecker and T. Morrisey for the purpose of equipping a public service plant.

The Pine Products Company, whose incorporation at New Orleans was noted recently, will erect a plant with a capacity of 10,000 cords per year for the distillation of waste wood. The officers are J. V. Leitch, New Orleans, president; W. W. Hines, New Orleans, secretary and treasurer; W. M. Heald, Laurel, Miss., director.

The Bettes Power Company, Idabel, Okla., recently reported as planning a hydroelectric plant on Mountain Fork River, will develop about 5000 hp. J. R. Clark of San Antonio, Tex., George A. Cardon of Dallas, Tex., and H. S. Bettes of Paris, Ark., are the interested parties.

The Arkansas Packing Company, Pine Bluff, Ark., has awarded a contract for the construction of a $60,000 plant, with a capacity of 100 cattle and 200 hogs daily. A lard factory is to be included.

The Gaines Creek Coal & Mining Company, Wilberton, Okla., has been incorporated with $10,000 capital stock by David B. Bridges, Martin S. Burdick of Wilburton and William J. Hammers of Adamson, Okla., to equip and operate coal lands controlled by them.

A five-gin plant for handling the cotton crop in the vicinity of Atkins, Ark., is being considered by W. H. Jones and others at that point. It is planned to operate it by electricity and to equip a generating plant for public service.

The Frisco Farmers' Independent Gin & Elevator Company, Frisco, Okla., has been incorporated with $10,000 capital stock by J. W. Mobley, E. N. Massey, John Hayes and J. W. Stegall to equip an elevator for grain and also a cotton ginning plant.

A cotton ginning plant to cost between $5,000 and $10,000 is contemplated by F. M. Russell of Sedan, Okla.; W. B. Hancock of Mountain View, Okla., and J. F. Gourley of Gotebo, Okla. It is to be erected at Sedan.

The Farmers' Cotton Oil Company, Mangum, Okla., of which G. O. McKinzie is manager, has completed arrangements for a cotton seed oil mill of 80 tons daily capacity.

The city of Rayville, La., is considering the establishment of electric light and waterworks plants and is in the market for propositions for construction and also for a franchise.

The Marshfield Electric Company, Marshfield, Mo., with $10,000 capital stock, has been incorporated for the purpose of equipping a public service plant by John E. Hosmer, Jefferson B. James and J. E. Haymes.

Plans are being prepared by Rollins & Westover of Kansas City, Mo., for the city of Ridgeway, Mo., for a $15,000 electric light plant.

The Hastings Light & Power Company has been incorporated at Hastings, Okla., for the purpose of equipping a public service electric plant at that place.

The Green Forest Milling & Elevator Company, Green Forest, Ark., with $25,000 capital stock, has been incorporated by Joseph Villines, G. W. Coxsey and M. A. Oldham to equip a grain milling plant and elevator.

A shingle mill is to be equipped at Lockport, La., by the Waddell-Jones Company, Morgan City, La., which has also bought the Gibson Cypress Lumber Company at Gibson, La.

A double circular sawmill with a daily capacity of 100,000 ft. of lumber will be built at Mandeville, La., by Poitevant & Favre Lumber Company, of New Orleans, La.

The Braud-Bates Lumber Company, Shreveport, La., with $25,000 capital stock, has been incorporated by Henry C. Braud, J. C. Bates and others and will equip a plant, including a planing mill.

C. R. Baum, of Minneapolis, Minn., has plans, it is reported, for the establishment at Kansas City, Mo., for the manufacture of steel specialties.

The Frisco Sludge Company, Joplin, Mo., incorporated by W. M. Lycan, F. Stilwell, B. A. Dennis and Delmar C. Wise, will build a 50-ton mill near Smelter Hill.

A central heating plant is to be equipped at the State Hospital for nervous diseases at Little Rock, Ark., under the direction of the Governor of Arkansas.

The Jefferson Shell & Contracting Company, New Orleans, La., with $50,000 capital stock, has been incorporated by Charles D. Warren, Otto T. Maier and Edward McCaleb and will equip for dredging contracts, etc.

The Edwards Elevator Company, Foraker, Okla., with $10,000 capital stock, has been incorporated by D. J., D. C. and H. J. Edwards and will equip a grain elevator.

The Central Broom Mfg. Company, Conway, Ark., with $10,000 capital stock, has been organized by L. H. Pyle, J. Haydon and A. E. Pyle and will equip a broom manufacturing plant.

The Western Silo Company, Des Moines, Iowa, has plans for the equipment at Texarkana, Ark., of a plant with a capacity of 500 silos each year.

The Hattiesburg Wood Reduction Company, Hattiesburg, Miss., will increase its capital stock from $50,000 to $100,000 and will install additional equipment to increase its manufacturing capacity.

The McEwen Mfg. Company, Tulsa, Okla., with $200,000 capital, has been incorporated by J. H. McEwen, F. M. Grove and L. J. Martin to manufacture oil well supplies, etc.

The Howard Stove Works at Ralston, a suburb of Omaha, Neb., whose plant was entirely destroyed by the recent tornado with the resultant loss estimated at $75,000, will rebuild at once.

The plant of the Argenta Boiler & Iron Works, Argenta, Ark., has been purchased at receiver's sale by John F. Gorton, one of the former proprietors, who will continue the operation of the plant.

Texas

AUSTIN, TEXAS, April 12, 1913.

An improvement in machinery trade conditions is particularly noticeable in Arizona and New Mexico. The mining activities in those States show an increase and there is a consequent demand for machinery. Much is also being done in the Southwest in the way of irrigation, and almost every week development operations are brought to light in some new locality. Unseasonably cool weather and lack of sufficient rain have somewhat marred crop prospects in southern Texas, but it is thought these unfavorable conditions will soon be overcome and that bountiful yields of cotton and corn will be obtained.

George S. Courtney will erect a large broom factory at Stamford.

Preparations are being made to install a municipal waterworks plant and lay a system of distributing mains at Richardson. An electric light plant will also be established.

The Trans-Pecos Mining & Development Company, which has been organized at Dayton, N. M., with a capital stock of $1,000,000, will bore a number of oil wells on a tract of land it owns near that place. The officers of the company are A. F. McChesney of Pecos, Texas, president; J. B. Davis, of Pecos, vice-president, and Porter A. Whaley, manager.

Nicholas & Whaley will establish a plant for the manufacture of wagon end-gates at Gainesville.

The Angleton Gin & Power Company is constructing a system of electric lighting for Angleton.

The H. Ditlinger Roller Mill Company is erecting a flour mill at New Braunfels which will have a capacity of more than 500 barrels of flour per day. The building is of steel and reinforced concrete construction.

The Chamber of Commerce is promoting the establishment at Beaumont of a plant for the manufacture of turpentine, rosin and pine oil from yellow lumber waste.

A company has been organized with headquarters at Paris for the purpose of constructing a large hydroelectric plant and waterworks reservoir and pumping plant at Mountain Fork, Okla. It is proposed to supply a number of towns in Oklahoma and Fort Worth, Dallas and Paris with electric power and water.

J. W. Guines will erect an ice factory at Franklin.

Preparations are being made to construct a factory at Seguin for canning fruits and vegetables.

The Anheuser-Busch Brewing Association of St. Louis, Mo., will erect a large ice factory and cold storage plant at Brownsville. This company also contemplates erecting similar plants at a number of other points in southern Texas, it is stated.

The taxpayers of Fort Worth have voted favorably on the proposition of issuing $300,000 of bonds for additional construction work on the large municipal water storage reservoir.

The Southern Irrigation & Sugar Company, which was recently organized with a capital stock of $2,000,000 under the laws of Maine, has established headquarters at Brownsville, Texas, and will, it is stated, erect a large sugar mill and probably a sugar refinery plant near that place. F. Augustus Heinze of New York is at the head of the company. W. C. Shaw of Brownsville is trustee and local manager.

The Mission Electric Light & Waterworks Company will soon begin the construction of a waterworks plant and distributing system and an electric light and power company at Mission.

The Oriental Oil Company will construct a cottonseed oil mill at Dallas at a cost of about $100,000.

The Indiana Silo Company will erect a factory at Fort Worth for manufacturing silos. The plant will have a capacity of 50 silos a day.

The Port Arthur Rice & Irrigation Company has adopted plans for extensive improvements to its irrigation pumping plant near Port Arthur. The proposed work will cost about $40,000.

The Brazos River Briquetting Company, New Castle, which was recently organized with a capital stock of $50,000, will construct a plant for the manufacture of briquettes out of coal. The incorporators are L. C. Kinney, M. B. Kinney and S. W. Scott.

The C. S. Reynolds Gin Company will establish a cotton gin at San Benito. The incorporators of the company are C. S. Reynolds, T. B. Bowen and Nathan Craig.

The Galveston, Harrisburg & San Antonio Railway Company will erect repair shops and an 18-stall concrete roundhouse at Del Rio.

The Layne & Bowler corporation will erect a plant at Deming, N. M., for manufacturing a patent shutter screen for use in irrigation wells.

The Rio Mimbres Irrigation Company will install a number of irrigation pumping plants upon wells it will put down upon its tract of 65,000 acres of land near Deming, N. M. It will also lay out a new town upon the property and equip it with modern public utility plants.

The City Council of Deming, N. M., has arranged for augmenting the municipal water supply. Additional machinery will be installed.

The Pacific Coast

PORTLAND, ORE., April 8, 1913.

While the near prospect of tariff changes has had a distinctly disquieting influence on general business, the principal factors in the machinery business of this territory have not yet been affected. The coastwise lumber market is a little easier, but the demand is heavy and both rail and offshore trade continues in excellent shape. The last few weeks have brought a general resumption of logging operations at many points which were closed during the winter. Logging railroads are being extended, and many new locomotives put in service, while the demand for handling and loading devices, as well as general camp equipment, is unusually active. Sawmills are coming out for improved machinery, and inquiries are appearing for a number of complete mill outfits, including some of rather large size. There is a steady buying movement for the fish and fruit industries, preparations for the Puget Sound salmon run being exceptionally large. Work is being started on several interior development projects, calling for a large amount of miscellaneous machinery. Some large installations of paper mill machinery are now nearing completion, and the outlook for further business in this line is uncertain, the output now being rather large for coast requirements.

Small orders are still the rule in the machine tool market, but the demand is comparatively active, with numerous inquiries from small shops and garages, as well as from lumber interests, throughout Oregon and Washington. The amount of lumbering machinery made in this vicinity, and the increasing volume of repair work, are encouraging factors. Exports of machinery from Puget Sound ports are unusually heavy, the principal item being agricultural equipment for Vladivostock and Dalny.

The entire plant of the Sumner Iron Works, Everett, Wash., manufacturing sawmill machinery, was destroyed by fire April 4, with an estimated loss of about $300,000. The office building and records were saved, and the plant was well covered by insurance.

The Heffernan Drydock Company, Seattle, Wash., will start construction shortly of a floating pontoon drydock 612 ft. long, with a lifting capacity of 18,000 tons.

The Machinery & Supply Company, Portland, has been incorporated with a capital stock of $40,000, by A. G. Wallace, A. G. McClane and A. J. Moser.

It is reported that the Great Northern Railway will this year build a large roundhouse and machine shop at Leavenworth, Wash.

The Spokane, Portland & Seattle Railway plans to build a large roundhouse, shops and storage tracks this summer at Overlook, Wash.

The Spokane Auto Parts Company, Spokane, Wash., is preparing to install a large gas steel-tempering furnace.

The Washington Machine & Foundry Company, Vancouver, Wash., has been incorporated with a capital stock of $25,000 by F. J. Wendlick, J. E. Andrews and others, who are now operating a machine shop and expect to make a number of improvements.

The plant of the Pacific Lumber & Shingle Company, Salem, Ore., was destroyed by fire March 20, with a loss of about $50,000. It is announced that rebuilding will be started as soon as the insurance is adjusted.

The Sumner Iron Works, Everett, Wash., was damaged by fire April 4, the loss being estimated at $30,000.

The Light Granite Company has made a proposition to start a stone plant at Snohomish, Wash. The plan announced includes a 20-ton crane, lathe and other cutting equipment.

The Union Flour Mills, W. W. Swanson, manager, proposes to build a new flour mill at Spokane, Wash.

The Wenatchee Valley Gas & Electric Company has let contracts for the construction of a new gas plant at Wenatchee, Wash.

The Zimmerman-Degan Shoe Mfg. Company is planning to double the capacity of its factory at Seattle, Wash.

Bids have just been taken for machinery, etc., for the Snake River District Improvement Company's pumping station in Malheur County, Ore.

Eastern Canada

TORONTO, ONT., April 12, 1913.

The International Paper Company has plans for the erection of a large paper mill at Chelsea, Que. Some time ago this company secured an option on the power rights at Chelsea, after a careful survey of the falls by its own expert engineers.

The Dominion Steel Foundry Company of Hamilton has been formed. It will have a capital of $1,000,000 preferred and $1,000,000 common stock. The company is a merger of the Dominion Steel Castings Company and the Hamilton Malleable Castings Company. Arrangements are being made to enlarge the plants of both companies, which adjoin one another.

The Canadian Casket Company and the Lusty Lumber Company of Rodney, Ont., were completely destroyed by fire with a loss of $20,000.

Contracts for the plant and buildings of the Abitibi Pulp & Paper Company, at Iroquois Falls, Ont., have all been let, and the work is being pushed ahead as fast as weather conditions will permit. The installation of machinery will be completed early next year. The company proposes to complete at once a 180-ton pulp mill and operate this to turn out in excess of 50,000 tons a year, and to develop at Iroquois Falls 21,500 hp.

The North Sydney Herald is authority for the statement that the Nova Scotia Steel & Coal Company is to spend over $1,000,000 in Sydney mines this summer. A coal mine is to be opened near Pond street, in the heart of the town, to be electrically operated. It will be one of the most extensive coal mines in Nova Scotia and the biggest producer in the company's chain, requiring 1500 men. A coal washing plant to cost $150,000 will be erected. It is also intended to construct a 50-ton open hearth steel furnace, with a battery of gas producers.

The Ham & Nott Company, Brantford, Ont., has decided to still further enlarge its plant. It will erect a new warehouse, 80 x 100 ft., and this will allow much more room for the installation of additional machinery. There will also be increased power.

The Maritime Motor Company, whose new factory will be in operation about May 1, has merged with the Palmer & Singer Mfg. Company, of New York, and will adopt for the Canadian trade the type, design and materials at present being used by that company.

The New York Graphite Company will erect a refining plant at Harcourt, Ont. The works will have a capacity of 100 tons of ore per day of 24 hours, which will require the employment of 50 men.

The factory of the Steel Equipment Company to be erected this summer and to cost $56,000 will be located at Girouxville, Ont., on a site between the box factory and the Canadian Northern Railway, comprising six acres of land.

Building permits have been issued to the De Laval Dairy Company of Peterborough, Ont., for the construction of three new factory buildings at a total cost of $45,000. Two of the buildings will be 112 x 208 ft. each, while the third will be 50 x 160 ft. The latter will cost about $5,000 and will be completed about June 1. All three buildings will be of brick and concrete construction. The J. W. Ferguson Company of Paterson, N. J., contractors, will have charge of the work.

The Cape Breton Electric Company is shortly to erect a power station at Reserve Junction, N. S., in which will be installed a powerful generator to furnish the necessary power for the Sydney and Reserve ends of the tram service. As soon as this large plant is installed the smaller plant in commission at Dominion for the last four years will be dismantled.

The Campbell Steel & Iron Works, Ottawa, is doubling the size of its plant. It produces everything in steel bridge work, steel building construction and architectural work. It has six acres of land on Carling avenue and is now running to the limit of its capacity. W. J. Campbell is the president, A. Campbell is vice-president and general manager and H. G. Campbell is secretary-treasurer.

The Wallaceburg Brass & Iron Works, Wallaceburg, Ont., is completing plans for an extensive addition to be made to its plant.

T. Hall & Co., St. Thomas, Ont., will erect a machine shop at Port Stanley, Ont., and equip it for marine repair work.

The Board of Water Commissioners of the city of London, Ont., H. J. Glambitz, general manager, will open bids until May 1 for 1450 tons of 4, 6, 8, 10 and 12-in. cast-iron pipe, 20 tons of special castings and 94 valves.

The Bawden Machine & Tool Company, Toronto, will build a machine shop, structural steel construction. Contract has been let.

The American Watch Case Company, Toronto, Ont., will build a four-story factory on King street.

Vickers' Sons & Maxim, at Maisonneuve, Que., last year installed one of the largest floating drydocks in the world, and are rapidly completing their shipbuilding plant on some 30 acres of land reclaimed from the river. The shipbuilding plant will be ready for active construction in the early fall. Ultimately the plant will be so developed that it can build and launch three dreadnoughts simultaneously. The Canadian Vickers shops are now fully equipped for repair work of all kinds and steel ship construction. The facilities of the plant include large punch and shearing machines, angle cutters, power drills, plate countersinking machines and other big mechanical equipment necessary for the most advanced class of work.

The Canadian Canners, Ltd., Waterford, Ont., is preparing to erect an addition to the factory.

Western Canada

WINNIPEG, April 12, 1913.

The snow is about all off the ground in western Canada at this date; seeding is starting in most places, and there is a better tone to business generally on that account. Excavations are under way for quite a few large business and industrial buildings, and it is now being predicted by good authorities that there will be a large amount of industrial growth throughout this part of Canada this year. Practically the only drawback is the financial stringency, and while there is not much relief yet in that respect, local financial houses are confident that the accommodation needed in western Canada will be forthcoming.

C. Schilling & Sons, manufacturers, of St. Paul, Minn., have purchased a site in Elmwood, Winnipeg, on which they will erect factory and foundry buildings. The lines to be manufactured here are stoves, ranges, castings and hotel and kitchen outfits.

The Weyburn Brewing Company is preparing to build a brewery at Weyburn, Sask. The trustee of the firm is Thomas H. Hillier.

Mackenzie & Mann, closely connected with the Canadian Northern Railway, are figuring on extensive hydroelectric developments along the Fraser River in British Columbia. For some time they have been active in securing water rights.

The City Council of Moose Jaw, Sask., is planning waterworks extensions at a cost of about $175,000. The bylaw was recently passed. The clerk is W. F. Heal.

The City Council of Prince Albert, Sask., is planning waterworks extensions at a cost of $135,000. The clerk is C. O. Davidson, and the engineer in charge J. E. Askwith.

The sawmill of the Thompson River Lumber Company, Kamloops, B. C., recently burned, is likely to be rebuilt without delay.

It is reported that the Toledo Motor Truck Company, of Toledo, Ohio, has decided to locate a plant at Moose Jaw, Sask.

Extensive plans are being completed by the Hunt Engineering Company for the 2000-barrel cement mill which that company will erect at Medicine Hat, Alberta, this year. About 500 men will be employed in the construction of the cement mill and after completion the number will be increased by 250.

Charles H. Peth, of the Peth Candy Company, Wausau, Wis., has contracted for 10,000 ft. of space in the new industrial building to be built in Calgary. Mr. Peth will employ about 60 hands to start with, and this number will be doubled later.

Announcement is made through the Board of Trade that the Tripure Water Company of Canada, under the management of W. A. Lewis, will locate at 121 River street west, Moose Jaw, Sask.

The Imperial Oil Company, Sarina, Ont., has awarded its contract for the construction of a new freight shed at the mouth of the river at Fort William, Ont., to S. J. McQueen of Fort William. The new shed will measure 50 x 400 ft. and will be constructed of corrugated iron, and will be fitted with all modern appliances. Gradually the company has extended its plant until now it employs about 50 men.

It is stated that the Smart Bag Company will in the near future establish two branch factories in western Canada, one at Saskatoon and the other at Vancouver. The company already has three factories in operation, at Montreal, Winnipeg and Toronto, but the western Canada business has been so heavy of late that the Winnipeg factory cannot cope with it.

New Tools and Appliances

This is essentially a news department for which information is invited.

Fixture for Squaring Taps.—A recent modification has been made by the Bickford Machine Company, Greenfield, Mass., in its No. 1 plain milling machine which was illustrated in *The Iron Age*, October 27, 1910. The change which adapts the machine for the squaring of taps includes the use of a foot treadle to operate the feed and a chucking device consisting of a steel head arranged to make a quarter revolution in a cast-iron frame. The chucking device has two handles, one of which is firmly screwed into one side of the head and the other is connected in such a way that it operates the chuck which has a tapered nose fitting a corresponding taper in the head. The chuck is forced forward into the tapered section of the head by bringing these two handles together in either a vertical or horizontal position. After the work has been gripped the treadle is pushed down to feed the work to the cutters, thus performing the squaring operation. After the cut is completed the handles are swung through a quarter revolution and the treadle is then pushed down to feed the work through the cutters a second time which completes the squaring operation. Work ranging from ⅛ to 7/16 in. in diameter can be squared by the machine, which has a capacity of between 300 and 400 pieces per hour.

Tapping Device.—A tapping device with a ball drive and a geared quick return is a new product of the Charles L. Jarvis Company, Gildersleeve, Conn. The important features are the ball drive and its application at a point close to the work which adds to the rigidity of the tool without reducing its sensitiveness. The tap is driven at the same speed as the drilling machine or lathe spindle, power being transmitted by three balls that engage with lugs in the body of the device. To back out the tap the spindle of the drilling machine is raised, thus engaging the quick return gears. The drive in this case is secured by two balls which engage with the stationary gear. The device can be operated in either a horizontal or vertical position without the necessity of using a reversing belt and the taper shank screws into the body of the device, although this shank can be replaced by a clamping mechanism, secured to the outside of the spindle, that screws into the body like the taper shank and is tightened by two screws which compress the split bushing fitting around the spindle. Either steel or aluminum is used for the body of the device which is made in seven sizes with capacities for tapping holes up to 2 in. in diameter. Two screws serve to adjust the jaws, one actuating the jaws for centering the tap and the other controlling the floating jaws at right angles to the centering ones and providing the required grip to hold the tool. An adjustable stop is provided, so that holes of any required depth can be tapped and there is also an auxiliary supporting rod which steadies the device while in operation.

Vertical Portable Air Compressor.—A recent product of the Ingersoll-Rand Company, 11 Broadway, New York City, is a small vertical portable air compressor which has been developed for general factory use. The purpose of the design was to make the operation as nearly automatic as possible, automatic lubrication being provided and simple plate and ring valves are used. Two special features of the machines which are built in a number of sizes for both belt and motor drive with capacities of from 4 to 23 cu. ft. and a maximum pressure of 150 lb., are compactness of design and dustproof construction.

Variable-Speed Countershaft.—The Madison Machine Company, 310 Carroll street, Madison, Wis., has brought out a variable-speed countershaft, consisting of an iron frame carrying two shafts. On these shafts are mounted two pairs of conical shaped pulleys and a trapezoidal shaped belt runs between them. One of the pulleys of each pair is fixed and the other can be adjusted along the shaft by hydraulic pressure from the cylinders on the countershaft. The speed ratio can be varied to any desired figure within the range of the countershaft by increasing the space between the pulleys on one shaft and decreasing that between the pulleys on the other. A controller of either the piston or pneumatic type, the latter being the one recommended where air pressure is available, actuates the pistons controlling the movement of the pulleys. The countershaft can be mounted on the floor, wall or ceiling, according to the requirements of any particular case. The belt is endless and is of simple construction and the countershaft which is built in six different sizes up to 500 hp. is said to operate at a transmission efficiency of more than 94 per cent.

All-Geared Head Automatic Threading Lathe.—For rapid and accurate production of work the Automatic Machine Company, Bridgeport, Conn., has developed an inclosed all-geared head type of automatic threading lathe in which the lead screw is located in the center of the bed so as to be near the work and to be protected from chips. Positive control of the main spindle drive and the tool slides is provided and a single front and back tool slide having large bearing surfaces and taper gibs is substituted for the supplementary slides. The machine is adapted for threading both external and internal work with various forms of threads and formed cutters or regular tools from bar stock can be used as desired. The swing is 14 in. over the bed and 3½ in. over the carriage and any pitch up to a lead of one thread in 2 in. may be cut. Automatic tool feed and feed stops are provided, and it is possible for an operator to attend a battery of these machines or other work. The lathe is built in lengths ranging from 6 to 16 ft.

Portable Electric Grinding Machine for Centers.—The Smith Electric Tool Company, Cincinnati, Ohio, has brought out a portable electric grinding machine intended to be used exclusively for grinding centers. The shank which fits into a lathe tailstock has a pin to set the machine at 60 deg., but it can be changed to set the machine at any other angle that may be required. One of the advantages of grinding centers with this machine is that they can all be maintained at a uniform taper, thus making them interchangeable on the different lathes. The grinding operation is very simple and when the machine is mounted at the correct angle it is inserted in the tailstock. Adjustment for the cut is made by the tailstock screw, no other adjustment being required. The machines are shipped with an accurately centered blank shank ready to be turned to fit the tailstock of any lathe. Where the machine is to be used on lathes having different sizes of tailstocks, bushings can be supplied. The power for operating the machine is secured from any direct-current electric light socket.

Locomotive Tube Cleaner.—For removing the scale from the tubes used for supporting the arch over the combustion chamber in locomotive boilers, the Lagonda Mfg. Company, Springfield, Ohio, has adapted its Weinland quick repair head, which was illustrated in *The Iron Age*, May 23, 1911. Baffles are used in fireboxes to secure the more perfect combustion of the fuel and because of the very high temperature over the fire, unprotected metal cannot be used for supporting the brick and tile of which the baffle is composed. For this reason, tubes curved in the form of an arch and containing water are employed. These tubes are connected with the water jacket of the firebox, thus insuring a continuous circulation of the water and making the locomotive arch tubes a part of the heating surface of the boiler. An ordinary tube cleaner cannot be used for removing scale from these arch tubes on account of the curvature, and on this account the company has developed a special type of cleaner, in which the body or turbine part is very short, and the cutting head is connected to it by a universal coupling. This cleaner is driven either by compressed air or steam, and if desired, units of a similar nature driven by water-power can be furnished.

Motor-Driven Lathe.—The W. P. Davis Machine Company, Rochester, N. Y., is applying adjustable-speed motor drive to its 12 to 16 in. lathes, the motor being mounted on a plate above the headstock, which is so placed that the weight of the motor is supported without producing any tendency toward vibration. The armature shaft is extended and is fitted with a handwheel, thus providing a means for turning the lathe spindle over by hand when setting up or testing work. The spindle is directly connected to the motor through an intermediate gear and the drive from the spindle is either direct or through single or double back gears that provide two or three mechanical changes, all of the gearing being covered by guards. The controller is operated by a lever located on the apron where it is within easy reach of the operator. A speed range of from 500 to 1500 r.p.m. is provided and any make of adjustable-speed direct-current motor up to 3 hp. can be used.

Government Use of Power Trucks*

Data on the Cost of Upkeep of Horse-Drawn Vehicles Against Electric Vehicles

BY W. R. METZ†

In the fall of 1910 the writer and the accountant of our office were instructed to submit a report as to the desirability of purchasing motor trucks to replace horse-drawn wagons, and an investigation was made covering certain government departments and private firms. This report was submitted in November, 1910, and it was estimated that the office would save approximately $11,000 per annum if electric vehicles were purchased and all of the horse-drawn equipment sold. This report was approved and equipment purchased as outlined herein, and the results were most gratifying, as the saving during the first year was nearly $12,000, in spite of the fact that, during this year, only a part of the electric truck equipment was purchased and six horses were kept. Five of these horses have since been sold, and the saving during the next year will undoubtedly be increased.

Preliminary Investigation

The naval gun factory at Washington operated five electric trucks, two of which had been in operation for four years; one of these had a capacity of 2500 lb., and the other a capacity of 5 tons. The cost of operating the larger truck was about the same as the 2500-lb. wagon, excepting that the latter cost 75c. for charging per 40-mile radius while the 5-ton truck cost $1.10 for the same radius. The total cost of operation is given as $2396.84. This truck displaced two two-horse wagons and gave a net saving of truck over horses of $2460.92.

One large company operates a number of horse-drawn wagons, also a number of motor trucks, both electric and gasoline driven, at an estimated yearly expense of $464.81 for a one-horse vehicle and an additional charge of $275.71 for each extra horse. These costs do not include labor and stable expense. The costs of operation for the electric trucks used by this same company were $297.32 and $277.01 on the basis of 300 days' service per year. A similar comparison of the commercial and individual gasoline machines, assuming 300 days' service per year for the former and 365 days for the latter, gave results of $896.69 and $809.53 respectively.

In addition to the records obtained from this company, the attempt was made to secure data from a number of private firms, but unfortunately none of them had any exact figures and could only approximate the savings due to the use of both electric and gasoline-driven trucks over horse-drawn vehicles.

Vehicles Used by the Government

During the fiscal year 1910 and 1911, which were the last two years that horse-drawn vehicles were used exclusively, the total expenses for the stable were $31,113.58 for 1910, and $31,231.93 for 1911; and for the same years the cost of the delivery section was $17,093.93 for 1910, and $17,256.19 for 1911, making a total cost for the delivery and stable sections of $48,207.51 for 1910, and $48,488.12 for 1911. It should be stated here that the stable and delivery sections were entirely separate at this time, each being in charge of a foreman, whereas after the automobiles were used these sections were combined, although the costs were separated. Omitting the wages paid the drivers and messengers, the stable section alone cost $18,447.37, making the cost per horse per year $802.06, or $2.20 per day, of which 37¾c. was for feed. The total operating cost of one two-horse, 500-lb. wagon was $3368.86.

During the month of November, 1911, there were purchased and put into service two 1000-lb., two 2000-lb. and two 5000-lb. electric trucks, and at the same time 17 horses and their equipment were sold, leaving six horses, one 5-ton two-horse truck, one single-horse truck, one carriage driven by two horses, and one carriage driven by one horse. In November, 1912, one additional 5000-lb. truck and an electric-driven carriage were installed, and two carriage horses and one truck horse and their equipment were sold. In January, 1913, one 8000-lb. truck was installed, and two more truck horses and their equipment were sold. During the coming year, and after the remaining six horses are sold, four stablemen will be dispensed with and in their place there will be employed probably two helpers and one laborer at a total cost of $6.80 per day, a further reduction of $1377.20.

All of the electric trucks were purchased from the Baker Motor Vehicle Company, Cleveland, Ohio, and the iron-clad Exide storage batteries from the Electric Storage Battery Company, Philadelphia, Pa.

There have been no tire costs during the year, due to the fact that none of the tires have worn out, but it should be stated that the tires on the 5000-lb. trucks are practically worn out and, in fact, were being replaced during the month of January, 1913, so that the tires on these trucks wore out after running since December, 1911, or a period of 13 months. The tires on the 1000 and 2000 lb. trucks are still in fairly good condition. The tires on the 5000-lb. trucks would undoubtedly have lasted longer than they did were it not for the fact that these trucks were often loaded up to 7000 lb., making a considerably harder service than could have been anticipated by the makers.

The total cost of operating the combined delivery, stable and garage during the year 1912 was $24,446. In this connection it is interesting to note that the six electric trucks, doing practicaly all of the work, cost only about twice as much as the six horses. As a matter of fact the six electric trucks alone did as much work as the total stable force did during the year previous, and the horse-drawn equipment simply took care of the increased work. The cost of operating one 5000-lb. electric truck as compared with one 5000-lb. two-horse wagon was $2533.33, as against $6737.72, the saving due to the use of the electric truck is $4204.39.

Unfortunately no mileage record of the horse-drawn vehicles was kept during the previous years, but the records show that the two-horse wagon made an average of four trips per day, and the present records show that the 5000-lb. electric trucks make an average of eight trips per day. The mileage of the electric trucks being about 24 per day, it may be assumed that the mileage of the horse-drawn trucks was about 12 per day.

For the sake of comparison the costs of the three sizes of electric trucks and of the two-horse wagon are given in the accompanying table:

Costs of Electric Trucks and Two-Horse Wagon

	Two-Horse Wagon 5000-lb. Capacity	5000-lb. Electric Truck	2000-lb. Electric Truck	1000-lb. Electric Truck
Average trips per day	4	8	8	9
Mileage per day, average	12	24	20	20
Mileage per month (loaded halfway)	312	624	520	520
Average load per trip, lb.	4,000	5,500	2,500	900
Total load per day, lb.	16,000	44,000	20,000	8,100
Total load per month, tons	208	572	260	105.3
Total cost per month	$280.74	$211.11	$187.81	$180.93
Cost per mile	0.899	0.338	0.361	0.347
Cost per mile (omitting driver's and helper's wages)	0.499	0.138	0.121	0.107

The records kept include a daily meter record and a daily charging record which are made out, one for each truck, by the employees in the garage. These are turned in to the office each morning and transferred to the electrical vehicle record each month. This card is printed on both sides, thus providing space for a whole year. The electrical and mechanical upkeep are obtained from the regular mechanics' work slips. Every machine in the office is given a number, and all repairs made and materials used are entered on the work slip and charged against the machine number and tabulated in the office. In this way an accurate record is kept as to the cost of each machine. Under inspection is charged the time for charging batteries, washing the trucks and similar miscellaneous work in the garage, and all of this cost is evenly distributed among all of the trucks in service.

*From a paper to be presented at the spring meeting of the American Society of Mechanical Engineers, Baltimore, May 20.

†Superintendent of buildings Government Printing Office, Washington, D. C.

The Cambria Steel Company will pay off, on May 1, the $2,000,000 short term notes put out two years ago, and also $800,000 Manufacturers' Water Company notes, guaranteed by the Cambria Steel Company, from surplus earnings now in hand.

Trade Publications

Contractors' Equipment.—M. Mitshkun Company, Detroit, Mich. Catalogue F. Calls attention to an extensive line of contractors' equipment, including rails, track material of all kinds, cars for every purpose, railroad and excavator's equipment, etc. All of these are illustrated and briefly described with condensed tables of specifications.

Grinding Mills.—Charles Ross & Son Company, 148 Classon avenue, Brooklyn, N. Y. Circular No. 2-A. Illustrates and describes a line of stone, white lead and fine color mills, a page being given to each type. Sketches showing the general arrangement of a one-story lead and paint plant and a two-story paint plant are included.

Bearings.—Metaline Company, 43 Third street, Long Island City, N. Y. Catalogue. Treats of the use of Metalined or oilless bearings. After a discussion of what Metaline is, its use and method of application, a number of different types of bearings fitted with a Metalined box are shown and a number of testimonial letters are also reproduced.

Structural Steel.—Berkeley Steel Company, 218 Balboa Building, San Francisco, Cal. Mailing card. Lists the various kinds of steelwork which this company can supply. These include steel-frame buildings, steel bridges, steel headframes and hoist houses and towers and tanks.

Metal Working Machinery.—Richard Mfg. Company, Bloomsburg, Pa. Catalogue. Lists a line of metal-working machinery which includes bronze, copper, brass, steel, rod and tube-drawing machinery, wire-drawing and covering machinery, presses and grinding machinery. All of these are illustrated and briefly described, and condensed tables of specifications are included.

Punching and Shearing Machinery.—Royersford Foundry & Machine Company, Inc., Royersford, Pa. Catalogue No. 4. Consists of loose-leaf circulars covering an extensive line of punching and shearing machinery. A single circular is devoted to each of the 21 machines shown.

Self-Lubricating Bearing.—Dodge Mfg. Company, Mishawaka, Ind. Booklet. Deals with a capillary self-lubricating bearing. The advantages claimed for these bearings are a saving in expense, as well as in the amount of lubricant required and a smooth inside finish. The different types of bearing are illustrated and there are a number of sectional drawings showing how it is lubricated.

Shovels.—Wyoming Shovel Works, Wyoming, Pa. Two booklets. One which is entitled "Scientific Shoveling," contains an excerpt from "The Principles of Scientific Management" and refers to scientific shoveling test at the plant of the Bethlehem Steel Company, in which it was determined that a 21-lb. load was the most satisfactory one. Mention is also made of the fact that the shovels of this company were those used in making this test. The other pamphlet lists a line of shovels, drains and scoops for various uses. All of these are illustrated and briefly described.

Air Valves.—Hoffman Specialty Company, 210 Congress street, Boston, Mass. Folder. Calls attention to an automatic non-adjustable siphon air valve which it is claimed will not leak water or steam but will pass the last vestige of air. A brief description of the valve is given, together with exterior and sectional views.

Chisel Steel.—Firth-Sterling Steel Company, E. S. Jackman & Co., 710 West Lake street, Chicago, Ill., agents. Folders. Refers to a special chisel steel which will hold a keen edge. The special points claimed for this steel are that it will forge readily, harden uniformly and is tough and strong. Some of the various shapes of chisels made from it are shown.

Turret Head Boring Mills.—Gisholt Machine Company, Madison, Wis. Page for loose-leaf catalogue. Points out the value of a revolving turret head on a vertical boring mill, which enables a number of tools to be first set up and then used in rotation to bore and ream holes and perform facing operations. An illustration is given of one of the company's 52-in. mills finishing flywheels.

Rock Drills.—Scott Drill Company, St. Louis, Mo. Bulletin No. 6. Illustrates and describes the type C gasoline rock drill. This drill operates on the hammer principle, the drill steel not reciprocating, but being constantly in contact with the material which is being drilled. The drill steel is struck by a reciprocating hammer and after each blow is automatically rotated a slight amount. The various parts of the drill, which is operated by a two-cycle engine, are briefly described, and there are views of the drill in use. Instructions for operating and taking the drill apart are included.

Artistic Metal Work.—Howard & Morse, 45 Fulton street, New York City. Catalogue No. 171. Calls attention to an extensive line of artistic metal work in iron, steel, brass, copper, bronze and monel metal. This includes wire grilles and guards of all types, railings, skylight covers, fire escapes and wire signs, racks and baskets. The catalogue is made up almost entirely of engravings, each of which is identified by its particular pattern number.

Dust Blowing Sets.—B. F. Sturtevant Company, Hyde Park, Boston, Mass. Mailing card. Calls attention to a small blowing set for removing dust, chips, lint or light dirt of any nature from machinery, stockroom shelving, etc. The set consists of a small pressure fan inclosed in an aluminum case and driven by a direct-connected electric motor, the power being supplied by an electric light socket. A 12-ft. length of 1¼-in. reinforced hose and a 9-in. aluminum taper nozzle is included.

Air Compressors.—Pennsylvania Pneumatic Company, Erie, Pa. Folder. Illustrates and describes the Barr unit-compound air compressor which is built for belt, steam engine or electric motor drive. The capacity of the compressor ranges from 100 to 500 cu. ft. of free air per minute at pressures of from 60 to 100 lb. Illustrations of the different styles of compressors are included.

Car and Locomotive Brasses.—Ajax Metal Company, Frankford avenue and Richmond street, Philadelphia, Pa. Booklet. Deals with logging car and locomotive brasses, ingot metals, babbitt metals and castings for the lumber trade. After a brief description of the various metals, 56 pages are given over to photographs and drawings of the various car brasses and engine castings in general use, a single page being devoted to each. An engraving of the brass is given at the top of the page with the several plan and elevation drawings beneath, the various dimension lines being marked ready for the insertion of the necessary figures. These sheets are perforated so as to be readily detachable and are intended to be sent with the order. A number of tables of useful information are also included.

Molding Machines.—Mumford Molding Machine Company, Chicago, Ill., Vulcan Engineering Sales Company, Fisher Building, Chicago, Ill., sales agent. Catalogue No. 51. Illustrates a complete line of jolt-ramming molding machines, for use in foundries, ranging from a 3-in. machine with a capacity of 350 lb., up to very large ones having a maximum capacity of 50,000 lb. The advantages of the several types of pattern-drawing mechanism fitted to the jolt-ramming machines are brought out. Other types of machines illustrated include electric jolt-ramming machines for use where compressed air is not available, squeezing and vibrating machines. Mention is also made of supplies, such as sand-shakers, riddles, mold-driers, cranes, pneumatic hoists and a cold metal sawing machine. An illustrated description of the 3-in. core bench jolt-ramming machine appeared in *The Iron Age*, June 1, 1911.

Metal Paints.—Rinald Bros., 112 North Hancock street, Philadelphia, Pa. Three pamphlets. Call attention to the Bessemer paint which is designed to protect exposed steel work. Mention is also made of the enamels and the pure graphite and technical paints made by this firm, and a number of testimonial letters showing how well they have protected the materials to which they have been applied are included.

Sand Blast Machines.—Hoevel Sandblast Machine Company, 50 Church street, New York City. Catalogue H1913. Illustrates and describes a line of self-contained automatic and dustless sand blast machines. These are made in the revolving barrel and the rotary table types as well as in a sprocket table type suitable for long and flat pieces. Mention is also made of the sand blast cleaning chambers which this company builds.

Advertising Service.—Shuman-Booth Company, Westminster Building, Chicago, Ill. Folder. Calls attention to the specialized service which this company is prepared to furnish. The various phases of the preparation of advertising copy are taken up and briefly described, and a partial list of the work which has been done by this firm is included.

Electric Riveting Machines.—Eveland Engineering & Mfg. Company, Philadelphia, Pa. Pamphlet. Relates to an electric riveting machine which is thoroughly self-contained and is suitable for handling any size or length of rivets. The machine can use any form or shape of rivet head and will form the head automatically, the power for the riveting operation being secured from an incandescent light socket. In addition to riveting it is also possible to use the machine for general upsetting work and also for separating riveted pieces. A number of illustrations of the work done by this machine and the various shapes of heads that can be made are included. Four sizes of machines are built, handling rivets from ⅛ to ⅝ in. maximum diameter.

Disk Grinding Machine.—Charles H. Besly & Co., 118 North Clinton street, Chicago, Ill. Circular. Relates to the reduction in manufacturing costs by grinding as a substitute for milling, shaping or planing. The circular is made up almost entirely of illustrations showing surfacing operations being performed on pieces of various kinds and a brief description of the work performed in each case is given.

Pumps.—Goulds Mfg. Company, Seneca Falls, N. Y. Booklet. Describes how a centrifugal pump was used in making a quick and inexpensive swamp fill, and also shows a number of different types of centrifugal, diaphragm, suction, piston and triplex pumps. In addition to the engravings of the pumps there are views showing some of them in actual use.

Drill Chucks.—Weaver Mfg. Company, Springfield, Ill. Wall hanger. Gives data on the cutting speeds that should be used for lathes and drilling and milling machines, together with a diagram by which the speed for any particular machine can be fixed and recorded. On the reverse side are a set of decimal equivalents and data on machine, hand and pipe taps. Mention is also made of the company's roller jaw drill chuck, which was illustrated in *The Iron Age*, January 19, 1911.

Turbo-Undergrate Blowers.—B. F. Sturtevant Company, Hyde Park, Boston, Mass. Mailing card. Calls attention to a turbo-undergrate blower which is designed to overcome troubles caused by poor coal or defective draft. An illustrated description of this device appeared in *The Iron Age*, September 22, 1910.